THE HEATING AND VENTILATING MAGAZINE

1123 BROADWAY NEW YORK FEBRUARY, 1910

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Sixteenth Annual Meeting, New York, January 18-20, 1910

REVIEW MEETING

Attracted by the announcement of a review meeting, for which a digest was prepared covering the society's entire Proceedings, heating and ventilating engineers to the number of over 200 attended the various sessions of The American Society of Heating and Ventilating Engineers during its sixteenth annual meeting, at the Engineering Societies' Building, New York, January 18-20.

Scarcely second in importance to this feature of the society's programme was the consideration of the report of the committee that had undertaken to establish a standard rating for house heating boilers. The presentation of a minority report, together with dissenting opinions expressed by two other members of the committee, resulted in a discussion that threshed out the boiler rating question to an exhaustive degree and will give the new committee that is to work further upon the matter all the opinions it will be likely to need to determine the basis upon which it will continue the work.

President William G. Snow called the annual meeting to order, Tuesday, January 18, at 3.30 o'clock. The register showed the following present at the various sessions:

Lyman D. Aulds, New York.
Newell P. Andrus, New York.
Homer Addams, Philadelphia.
C. P. Atwood, Salem, Mass.
J. Scott Anderson, New York.
A. S. Armagnac, New York.
F. W. Burdick, New York.
Joseph B. Baker, New York.
Hugh J. Barron, New York.
George W. Barr, Philadelphia.
Reginald Pelham Bolton, New York.
Thomas Barwick, New York.
William Braemer, Camden, N. J.
F. Bleyer, Newark, N. J.
J. J. Blackmore, New York.
John Black, Trenton, N. J.
S. H. Brooks, New York.
William J. Baldwin, New York.
William J. Baldwin, Jr., New York.
Davis S. Boyden, Boston.
William R. Beach, Long Island City, N. Y.
W. A. Birdsall, Newark, N. J.
George W. Bymer, New York.
J. B. Bernhard, New York.
O. L. Badger, New York.
Edward S. Berry, Philadelphia.
H. C. Bushnell, New York.
R. C. Carpenter, Ithaca, N. Y.
Ralph Collamore, Detroit, Mich.
Frank K. Chew, New York.
A. Cone, New York.
F. T. Chapman, Montclair, N. J.
William H. Chenoweth, Jr., Chicago.
A. G. Cripps, Akron, O.
Frederick N. Cooper, Boston.
John F. Carney, New York.
Maxwell S. Cooley, Washington, D. C.
Albert A. Cary, New York.
J. W. Curtis, Norwich, Conn.
B. H. Carpenter, Wilkes-Barre, Pa.
James E. Costello, New York.
Bert C. Davis, Kansas City, Mo.
James A. Donnelly, New York.
F. K. Davis, Washington, D. C.
A. A. Dumond, New York.
J. F. LeLorme, New York.

ANNUAL DINNER OF THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS
AT THE NEW GRAND HOTEL, NEW YORK, JANUARY 19, 1910

R. G. Davis, Brooklyn, N. Y.
William F. Devendorf, Rochester, N. Y.
P. C. Doherty, Poughkeepsie, N. Y.
Edward B. Denny, Newark, N. J.
W. H. Driscoll, Jersey City, N. J.
J. E. Edwards, Allentown, Pa.
R. M. Ensign, Bridgeport, Conn.
Andrew C. Edgar, Philadelphia.
William T. English, Boston.
John G. Eadie, New York.
G. D. Farnham, New York.
John W. Fryer, New York.
A. M. Feldman, New York.
E. C. Fisk, New York.
J. C. Faulkner, New York.
Charles A. Fuller, New York.
F. A. Forgee, New York.
J. Logan Fitts, Camden, N. J.
Frank C. Fay, New York.
E. E. Fox, New York.
H. J. Fuller, New York.
Thomas C. Fleming.
J. B. Garfield, New York.
F. Gaskill, Montreal, Que.
Geo. O. Greely, New York.
J. E. Gray, Providence, R. I.
H. B. Gombers, New York.
W. H. Gurney, Paterson, N. J.
Joseph Graham, New York.
Howard T. Gates, New York.
Judson A. Goodrich, New York.
G. L. Greenman, New York.
R. B. Hunt, New York.
F. B. Howell, New York.
J. D. Hoffman, Lafayette, Ind.
James G. Hayes, Indianapolis, Ind.
Burt S. Harrison, New York.
Andrew Harvey, Detroit, Mich.
Geo. D. Hoffman, Chicago.
J. Elmer Heg, New York.
R. W. Hillman, New York.
H. H. Hellerman, Philadelphia.
E. J. Hurley, Boston.
John F. Hale, Chicago.
Richard Hankin, New York.
George Howard, New York.
D. W. Haird, New York.
W. M. Hyman, New York.
A. Edson Hall, Albany, N. Y.
H. L. Hinrichs, New York.
Harry de Joannis, Chicago.
T. P. Kieley, New York.
Arthur A. Kiewitz, New York.
Charles H. Kissam, Brooklyn, N. Y.
August H. Kroepke, New York.
William P. Kirk, Bridgeport, Conn.
C. V. Kellogg, Chicago.
D. D. Kimball, New York.
George W. Knight, Newark, N. J.
Sam Kauffman, St. Louis, Mo.
Conway Kiewitz, New York.
Henry H. Lee, Worcester, Mass.
Samuel R. Lewis, Chicago.
D. T. Lyon, New York.
J. P. Lisk, New York.
E. K. Lanning, Camden, N. J.
W. G. LeCompte, New York.
R. Lewen, New York.
L. L. Lewis, New York.
J. Irving Lyle, New York.
F. F. McNichol, Oshkosh, Wis.
Harold McGeorge, Cleveland, O.
William H. McKiever, New York.
Frank G. McCann, New York.
S. F. McDonald, Cleveland, O.
E. A. May, Chicago.
Robert Mayo, Jr., Washington, D. C.
F. S. Mills, Worcester, Mass.
W. M. Mackay, New York.
James Mackay, Chicago.
Ed K. Munroe, Baltimore, Md.
Charles Morrison, Boston.
J. W. H. Myrick, Boston.
William R. Munro, New York.
W. W. Macon, New York.
Charles A. Miller, New York.
Edward S. Mobley, Frederick, Md.
James H. Merritt, New York.
H. A. Mallory, New York.
Edward S. Mobley, Frederick, Md.
A. B. Marshall, New York.
William E. Mason, New York.
George N. Mahaney, New York.
John Mosner, New York.
Howard Newman, New York.
Frank M. Norton, New York.
H. Thurston Owens, New York.
George O'Hanlon, New York.
George S. O'Neil, Paterson, N. J.
C. W. Old, New York.
A. J. O'Neill, New York.
Walter B. Pelton, Boston.
F. T. Phillips, Philadelphia.
Andrew G. Paul, Boston.
Gustave Petersen, New York.
D. M. Quay, New York.
L. H. Quackenboss, New York.
C. S. Quay, New York.
C. H. Robertson, New York.
F. O. Runyon, Newark, N. J.
G. A. Robertson, New York.
William Ritchie, New York.
John W. Rowe, Boston.
E. E. Reilly, New York.
P. M. Richards, New York.
R. D. Reed, Westfield, Mass.
William G. Snow, Boston.
U. G. Scollay, Brooklyn, N. Y.
B. F. Stangland, New York.
H. A. Smith, North Tonowanda, N. Y.
Chas. D. Symms, Sioux Falls, S. D.
J. Serginsky, New York.
E. S. Storm, New York.
C. H. Symons, New York.
P. H. Seward, New York.
John T. Sadler, Elmira, N. Y.
Fred W. Smith, New York.
C. B. J. Snyder, New York.
F. H. Stevens, Chicago.
C. H. Staten, New York.
C. H. Seymour, New York.
L. B. Sherman, New York.
E. E. Spragge, New York.
D. Stewart, Wilkes-Barre, Pa.
H. E. Sherwood, Philadelphia.
E. L. Stock, Washington, D. C.
J. A. Sibell, Brooklyn, N. Y.
Charles E. Scott, New York.
James A. Swan, New York.
L. B. Sherman, New York.
W. R. Stockwell, Irvington, N. Y.
S. C. Smith, Scranton, Pa.
J. Stewart Thomson, New York.
J. H. Textorius, New York.
M. F. Thomas, New York.
Thomas N. Thomson, Scranton, Pa.
Walter Thompson, Elizabeth, N. J.
E. F. Tweedy, New York.
C. Teran, New York.
William C. Vrooman, Schenectady, N. Y.
Charles H. Whitney, Elmhurst, Pa.
J. M. Watson, Toronto, Que.
H. W. Whitten, Boston.
Warren Webster, Camden, N. J.
John C. Williams, New York.
W. G. Williamson, Detroit, Mich.
H. A. Wilson, Boston.
Theodore Weinshank, Indianapolis, Ind.
Harry S. Welsh, Rochester, N. Y.
H. A. Wilson, Boston.

Following the roll-call, the president read his annual address.

President's Address

This, the sixteenth annual meeting of the American Society of Heating and Ventilating Engineers, will differ materially from others in that most of our time will be devoted to the hearing and discussion of committee reports.

Our former president in his address a year ago outlined a plan for making this a review meeting. Based on his recommendation and the vote of the society, committees were appointed covering a wide variety of subjects to review our proceedings and prepare a digest of what has appeared in papers and discussions bearing on those subjects.

The reports of these committees will show us not only what has been done by the society, but will bring to our attention the branches that need developing, so that we shall be able to intelligently lay out a course of work for which a demand may have been shown to exist.

MORE PUBLICITY NEEDED

Aside from the review committee, we have a new one called the publicity committee, with its central committee of three and its subsidiary members in many of the States.

It has been felt that the work and aims of this society have not received as prominent mention in other than the engineering and trade press as should be the case. It is hoped that this committee will devise ways and that the society will provide means whereby this apparent deficiency will be overcome.

It is important not only to us as members of this society that its work should have the broadest possible publicity, but it is equally, if not more, important to the public that the facts brought out at our meetings in reference to methods of heating and ventilation should have the desired dissemination.

A number of resignations have taken place during the year, but many new members have been admitted, so that a net gain in membership of approximately 5% has been recorded.

IMPORTANT COMMITTEE WORK

Our committee on compulsory legislation has been active in securing data from the various States and in pushing this important work.

The committee on which perhaps the most work has developed is the one engaged in devising a method for rating boilers. This is a broad subject and one which requires careful study. This committee, which is practically a union of two committees, has been engaged in this work for months, and a tentative report was presented at the summer meeting; further investigation of the subject has been made since that time and the report to be presented at this meeting will merit the most careful consideration and the fullest discussion on the part of our members.

The knowledge that so many committee reports were to be presented at this meeting has probably deterred members from preparing and submitting original papers.

I feel that it is wise at this review meeting to consider whether or not we as individual members are doing all we should to advance the welfare and prestige of this society. The professional standard of our meetings is measured to a great extent by the number and character of the papers presented.

Data relating to installations which have proved successful under actual working conditions, descriptions of original methods for accomplishing certain results in heating and ventilation, records of tests, are all of interest and value.

As to tests, one of our standing committees bears that title, yet owing largely to lack of any appropriation to conduct tests, far less has been accomplished than the several heads of that committee have desired. As our society becomes more prosperous, it seems to me that money could be well spent in this field.

We should keep clearly in mind the objects set forth in our charter. With these objects in view, backed by enthusiasm on the part of members, a large field of useful effort spreads out before us and our achievements will benefit not only our members but the public at large.

THE SOCIETY'S DUTY TO THE PUBLIC

To the latter, I feel we owe a duty. The general acceptance of standards as to minimum heating requirements, the rating of heating boilers and the compulsory ventilation of buildings, these and other kindred subjects are of great importance to the public, affording some protection against disappointment and loss from defective or deficient systems of heating and ventilation.

It is of interest to note that one of the objects set forth in our charter is "To establish a clearly defined minimum standard of heating and ventilating for all classes of buildings." Our constitution makes no mention of this object.

In considering the adoption by this society of any standard, it is worthy of note that the constitution of one of the larger and older engineering societies states: "The society shall not approve or adopt any standard." In that society professional committees may be appointed, and "Reports of such committees may be accepted by the society and printed in the transactions, but shall not be approved or adopted as the action of the society."

I am not aware that our society has ever adopted any standards. Before doing so I would recommend that the subject in general receive careful consideration.

The growth in membership of this society must be a source of gratification to those having its interests at heart, yet we must bear in mind that it is not so much the numerical strength in membership as the strength of its members individually that counts in the long run in the usefulness of the society to itself and to the public at large.

There are many subjects pertaining to our profession to be investigated, many questions to be solved, much work to be done. If these matters be undertaken with an unselfish spirit, with a desire to add to the general fund of knowledge, we shall see results which will redound to the credit of this society and which will elevate the profession of heating and ventilating engineering.

SECRETARY'S REPORT

Your secretary would report an increase in membership during the past year. At the last annual meeting our membership was composed of 2 honorary members, 302 members, 26 associates and 17 juniors, or a total of 347 members of all grades. During the year we have elected 43 members, 7 associates and 4 juniors; 17 members and 2 juniors were dropped from the roll for non-payment of dues, 1 member and 3 associates failed to qualify, 4 juniors were advanced to full membership, 2 associates were elected to full membership, 4 members and 1 associate resigned, and we had 2 deaths in our ranks: Mr. T. J. Waters, a charter member of our society, who died February 25, 1909, and Mr. Max J. Mulhall, who was elected to membership June 25, 1909, and died July 30, 1909. Our present membership is 2 honorary members, 323 members, 27 associates and 15 juniors, or a total of 367 members of all grades, a net increase of 20.

The financial affairs of the society are in a good condition. At the last annual meeting there was a balance in the treasury of $1,947.95; there has been received from all sources during the year $3,952.14, this, with the balance on hand, making a total of $5,900.09. The total expenditures for the year amounted to $4,687.41, leaving a balance in the treasury of $1,212.68.

The secretary's expenses for the year, including stenographer, clerk hire, post-office box, certificates of membership, expenses in connection with the summer meeting, postage, express, telegraphs, telephones, office rent, etc., amounted to $1,204.45.

The secretary has a number of applications for membership on hand, which will insure a ballot being sent out as soon after this meeting as possible.

BOARD OF GOVERNORS' REPORT

Your board of governors met and organized on January 21, 1909, appointing committees on finance, membership and publication, and an executive committee.

A summer meeting was held at Indianapolis, Ind., on July 15 and 16, 1909, which was largely attended and succesful in every way.

Feeling that the society had received no benefit from membership in the National Fire Protection Association, the board decided to withdraw from same.

The board arranged for a meeting of the committee on boiler surfaces and the committee on standards at Niagara Falls, June 14 to 17, 1909, so that they could confer with the committee of the Manufacturers' and Steam Fitters' Asociations, which were meeting there at that time.

The board increased the discount on the proceedings to the booksellers, with the understanding that they were not to be sold at less than the regular price.

PROPOSED AMENDMENT LOST

Applications for a change of the constitution regarding the acceptance and publication of papers and the duties of the publication committee of the board of governors were received and were sent to the members for a vote, together with a letter from the officers of the society to the effect that in their opinion the change, as suggested, was unnecessary and would be detrimental to the best interests of the society. The number of votes cast was 153; 46 being in favor of and 107 against the amendment, which was lost, 102 votes being necessary for its adoption.

The board joined with the Illinois Chapter in sending a suitable floral tribute to the funeral of T. J. Waters, of Chicago, and engrossed resolutions bearing the signature of the president and secretary and expressing the sympathy of the society were sent to his widow.

Mr. John Gormly, a past president of the society, having retired from active business, tendered his resignation to the society. Action on it was deferred, and your board would unanimously recommend to the society that he be elected to honorary membership in the society at this meeting.

The society voted that two committee reports and a paper read from manuscript at the last annual meeting be printed and distributed. As customary in such cases, these reports and the paper were referred to the publication committee, which gave careful consideration to the matter and reached the conclusion that it would not be to the best interests of the society to print these in the form presented, but that they should be edited and published in the proceedings. A committee report, received at the summer meeting, which the society voted to have printed, was returned to the chairman at his request.

While we have lost more members during the past year through suspensions, resignations and deaths, our membership is larger than ever before, with indications of a large increase during the coming year, while the financial affairs of the society are in a prosperous condition.

TREASURER'S REPORT

Balance on hand Jan. 19, '09	$1,947.95
Cash received	3,252.14
Total	$5,900.09
Disbursements	4,687.41
Balance on hand	$1,212.68

As the result of a discussion regarding the time of expiration of the terms of the board of governors, a committee was appointed, on motion of P. H.

Seward, "to investigate the purpose of the constitution on certain points which may not seem clear, and report its interpretation of those points."

The report of the Committee on Compulsory Legislation, John F. Hale, chairman, was read by Bert C. Davis, Mr. Hale not as yet having arrived.

The report of the Committee on Legislation for New York State, Burt S. Harrison, chairman, was read by Frank K. Chew, as follows:

Legislation for New York State

Your committee has little to report in the way of anything actually accomplished other than the ascertainment of certain facts and conditions. The facts regarding loft ventilation are about as follows:

The law now in force requires that a certain amount of ventilation be provided, but does not designate just what is necessary to fulfill it. The enforcement of that law, and the determination of the actual requirements in each case to fulfill it, rest with one man. It is exceedingly difficult for him alone and unaided to accomplish the desired results. The small individual owner appears to be willing to conform to the requirements, but the large owners, real estate operators and corporations, rather prefer to fight, claiming that a one-man interpretation of a law is not apt to be a lasting one, and that every change in the office would bring a different interpretation. They even go so far as to insinuate, if not openly charge, bad faith.

It appears that there are many prominent people and bodies of people outside the society who would be glad to co-operate in a united movement to get such legislation, or would compel proper ventilation, and would definitely state what that ventilation should consist of under different conditions. It appears that through the Federation of Labor, the unions themselves could be enlisted in the cause to better their own conditions.

This committee, therefore, recommends that a committee of three men be appointed, with power to draft a bill for presentation to the legislature within one month, and that the committee shall invite any and all persons and bodies outside the society to co-operate and lend the weight of their influence to get the bill passed this year.

The bill should designate the necessary degree of ventilation; and require that the system installed be a ventilation system in fact as well as in name. It should prohibit such installation as can be made inoperative as soon as the inspector's back is turned, as well as those wherein the ventilation is attempted by means of untempered air. A cold, drafty ventilation should be prohibited.

The report of the Illinois Chapter showed this branch of the society to be in an active and healthy condition.

Figures of tests of long and short pin indirect radiators were included in a report of the Committee on Tests, J. D. Hoffman, chairman. This report will be presented in next month's issue.

Evening Session, January 18

Upon the convening of the evening session, the vote for the election of officers was announced by E. K. Munroe, for the tellers, as follows:

NEW OFFICERS

President, James D. Hoffman, Lafayette, Ind.

First vice-president, Reginald Pelham Bolton, New York.

Second vice-president, Samuel R. Lewis, Chicago.

Secretary, William M. Mackay, New York.

Treasurer, U. G. Scollay, Brooklyn, N. Y.

Board of Governors: R. C. Carpenter, Ithaca, N. Y.; James Mackay, Chicago; Judson A. Goodrich, New York; John F. Hale, Chicago; and George W. Barr, Philadelphia.

The remainder of the evening session was taken up with the discussion of the boiler rating question. The majority report of the committee on this subject was read by H. A. Smith, Prof. J. H. Kinealy being unable to attend the meeting. The report is presented herewith:

NEWLY-ELECTED OFFICERS, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

The Disputed Ratings Proposed for House Heating Boilers

As a result of its labors, the committee presents herewith,* in Table I, a rating of cast-iron house-heating boilers, based upon the area of grate surface and the coal burned per hour per square foot of grate surface.

In compiling the table, your committee has considered:

1. That the area of the grate shall be the area of the openings in which the grate is placed, measured to the outermost limits of air openings.

2. That the boiler is to be used under average working conditions, carrying steam at 2 lbs. pressure; that the draft shall be sufficient to burn the number of pounds of coal per hour given in the table, and that the coal used shall be a good quality of anthracite coal, having a heating power of 13,000 B. T. U. per pound of dry coal.

3. That the rating as given in the table means the number of square feet of direct radiation steam surface that can be carried by the boiler, based upon the supposition that each square foot of direct radiation steam surface emits 250 B. T. U. per hour with steam at 2 lbs. pressure in the radiator and with air surrounding the radiator at a temperature of 70°.

This table is the result of a careful study of the whole question of house-heating boilers, and your committee recommends that it be adopted and used by the members of the American Society of Heating and Ventilating Engineers as giving the standard ratings of cast-iron house-heating boilers.

APPOINTMENT OF COMMITTEE ON BOILER RATINGS ADVOCATED

Your committee recommends that a committee, to be known as the committee on boiler ratings, be appointed yearly by the society, to act alone or, preferably, in conjunction with similar committees appointed by other societies or associations, to consider all questions that may arise in connection with boiler ratings, and especially those questions arising from improper or insufficient ratings of boilers. If a manufacturer of boilers shall consider that his boiler is entitled to a rating

*From the report of the Joint Committee, consisting of the committee on Standards and the committee on House-Heating Boilers, presented at the annual meeting of the American Society of Heating and Ventilating Engineers, New York, Jan. 18-20, 1910.

TABLE I—RATING OF HOUSE-HEATING BOILERS.

Area of Grate Sq. Ft.	Pounds of Coal Burned per Hour per Sq. Ft. of Grate	Total Pounds Coal Burned per Hour	Rating of Boiler Sq. Ft. Radiation Capacity
1	2.67	2.67	82
1.5	2.96	4.44	140
2	3.59	7.18	226
3	4.21	12.63	390
4	4.55	18.20	585
5	4.88	24.40	780
6	5.06	30.36	975
7	5.24	36.68	1,165
8	5.36	42.88	1,405
9	5.48	49.32	1,650
10	5.60	56.00	1,890
11	5.71	62.81	2,125
12	5.82	69.84	2,360
13	5.93	77.09	2,595
14	6.08	85.12	2,915
15	6.23	93.45	3,235
16	6.35	101.60	3,485
17	6.46	109.82	3,730
18	6.51	117.18	4,010
19	6.55	124.45	4,285
20	6.58	131.60	4,545
21	6.61	138.81	4,800

higher than the standard rating, and shall take the matter up with the committee on boiler ratings, and shall submit to it the results of tests made as hereinafter provided, the committee shall consider the matter and shall report its conclusions to the manufacturer of said boiler and also to the society at its next regular meeting.

Your committee recommends that when a house-heating boiler is tested to determine its rating, the method of testing shall conform as nearly as possible to the "standard" method of testing boilers prescribed by the American Society of Mechanical Engineers, with some slight modifications, as follows:

HOW BOILERS SHOULD BE TESTED

The test is to be started by building a wood fire, raising steam, and keeping the boiler under working conditions for at least one hour. Then the fire is to be drawn and a new one made, and coal is to be added as rapidly as possible until approximately 50 lbs. of coal per square foot of grate surface has been added. In small-sized boilers the firing interval should, preferably, be about 8 hours; in medium-sized boilers, about 6 hours; and in large boilers, about 4 hours.

The steam pressure shall be maintained as nearly as possible constant during the test; and the weight of steam made shall be determined either by weighing the water fed to the boiler or, preferably, by condensing the steam as it comes from the boiler, but in all cases the amount of moisture carried by the steam must be determined and correction be made therefor; and the feed water shall, where possible, be supplied to the boiler hot.

The coal used shall be a good quality of anthracite coal, having as nearly as possible a heating power of 13,000 B. T. U. per pound of dry coal; and the rate of combustion shall be nearly as possible as given in Table I of this report.

Just before closing the test the ash pit shall be cleaned, and at the end of the test the grate shall be dumped; and the difference between the weight of carbon in 2 lb. of the ash during the test and the weight of carbon in 2 lb. of the ash and coal obtained when the grate is dumped at the end of the test shall be taken as the weight of combustible per pound of ash and coal left on the grate at the end of the test.

No test shall be for a shorter period than 8 hours; and observations of temperatures, pressures, etc., shall be made at intervals of at least one-half hour.

ITEMS OF TEST

The following items should be determined by a test:

1. Date of test.
2. Duration of test.
3. Time of starting the fire.
4. Time of commencing the test.
5. The number of times fired.
6. Interval between firings.
7. Square feet of grate surface.
8. Square feet of fire surface.
9. Square feet of flue surface.
10. Total heating surface.
11. Kind of fuel used.
12. Analysis of the fuel. (Fixed carbon, volatile matter, and ash.)
13. Total weight of fuel fired.
14. Total weight of fuel left on the grates.
15. Total weight of fuel burned during the test.
16. Total weight of fuel burned during the test per hour.
17. Total weight of fuel burned during the test per hour per square foot of grate.
18. Total weight of ash and clinker.
19. Temperature of gas leaving the boiler.
20. Temperature of steam leaving the boiler.
21. Temperature of feed water entering the boiler.
22. Temperature of the boiler room.
23. Chimney draft — inches of water.
24. Pounds of water evaporated during test.
25. Pounds of water evaporated from and at 212°.
26. Pounds of water evaporated per pound of fuel as fired.
27. Pounds of water evaporated per pound of dry coal.
28. Pounds of water evaporated per pound of combustibles.

29. Pounds of water evaporated per square foot of total heating surface.

30. Total B. T. U. delivered to the steam from the boiler.

31. Boiler capacity in square feet of direct radiation steam surface.

(This is obtained by dividing the total B. T. U. delivered to the steam by 250.)

32. Analysis of the flue gases.

Your committee recognizes that there are some items named above which it will be difficult to obtain under all conditions, but which the committee feels should be obtained where possible, as the fuller and more complete is the information in regard to each test, the fuller and more complete will our information in regard to house-heating boilers become in the course of time.

In conclusion, your committee desires to say that in the matter of preparing a code for testing house-heating boilers it has had aid from Professor J. D. Hoffman and Professor R. C. Carpenter, neither of whom is a member of the committee to whom this matter was referred.

Respectfully submitted,

J. H. KINEALY, Chairman;
JOHN R. ALLEN,
W. L. BRONAUGH,
ALBERT B. FRANKLIN,
WM. M. MACKAY,
H. A. SMITH.

Before the subject was opened for discussion P. H. Seward read the following minority report:

A Proposed Substitute Method for Rating House Heating Boilers

The following recommendations* are submitted with reference to the subject of boiler ratings:

1. At the 1909 annual meeting the following resolution was passed and referred to committee on standards:

"*Resolved*, That it is the sense of this society that in the absence of any standard for rating steam and hot water heating boilers, one should be established, based on coal consumed per square foot of grate surface and efficiency."

2. It is recommended that the rate of combustion be determined as follows:

(a) Divide boilers into four classes.

Small boilers, less than 6 sq. ft. grate area.

Medium boilers, 6 to 10 sq. ft. grate area.

Large boilers, over 10 sq. ft. grate area.

Heavy duty boilers, over 20 sq. ft. grate area.

If boiler has magazine feed or fire pot of an irregular shape, the class to which it belongs shall be determined by mean effective area of fire pot on same basis as grate area specified.

(b) Fix the firing period for each class.

Small boilers, 8-hour run on one firing.

Medium boilers, 7-hour run on one firing.

Large boilers, 6-hour run on one firing.

Heavy duty boilers, 4-hour run on one firing.

(c) The maximum coal burned during one firing period to be 80% of the fire pot capacity when filled to a depth specified by maker, not to exceed center of fire door, or a total depth of 20 in. from top of grate bars, unless boiler is magazine feed, when the coal burned must not be more than 80% of the magazine capacity.

3. It is recommended that the efficiency to be claimed be determined by actual tests when boiler is operated in accordance with the foregoing division as to classes, firing periods and rate of combustion, using stove size anthracite coal as the standard fuel.

*Presented by P. H. Seward as a minority report of the committee on Standards and the committee on House Heating Boilers, and read at the annual meeting of the American Society of Heating and Ventilating Engineers, New York, Jan. 18-20, 1910.

4. It is recommended that the capacity or rating be calculated as follows:

Let C represent the pounds of fuel available for one firing period.

Let T represent firing period in hours.

Let E equal the total B. T. U. considered available per pound of fuel at boiler outlet, not exceeding results shown by tests.

Then $\frac{C \times E}{T}$ represents the boiler capacity per hour in B. T. U.

If rating is desired in equivalent square feet direct radiation, divide capacity in B. T. U. by 250 for steam and 150 for hot water.

5. It is recommended that a standard test code be used in making tests to determine efficiency for rating, and a special heating boiler test code committee be appointed by the new president to prepare such code, embracing the conditions heretofore specified, and report at the next annual meeting.

6. This method for rating heating boilers will give the widest possible latitude to individual manufacture and commercial requirements, as it provides for the classification of size and rate of combustion, from which an accurate heating surface ratio can be determined by designer according to the efficiency which seems possible or advisable.

———

Secretary Mackay read a letter received from E. D. Densmore, another member of the committee on rating boilers, to the effect that he had withheld his approval of the report. This was followed by a statement from President Snow, who relinquished the chair to Past President James Mackay while he delivered his remarks. Mr. Snow said:

———

President Snow's Discussion of Report on Boiler Rating

The title, "Report of Joint Committee, consisting of the members of the Committee on Standards and the Committee on House Heating Boilers, together with President Snow acting ex-officio," makes it incumbent on me to state that the report as presented is a majority report, but that I have been unable as an ex-officio member to agree to many of the conclusions reached.

Taking up the report in detail by the numbered paragraphs:

(1) I believe the definition of grate area could be improved on.

(2) The table presented is, as I understand it, the average of eight estimates, votes or opinions as to ratings based on what were considered fair rates of combustion and efficiencies for boilers having different grate areas when operated under practical working conditions in service.

Test conditions would naturally be expected to show higher ratings, how much higher is a question to be determined by the proposed boiler rating committee.

To my mind there are several objections to having such a committee. In the first place, I do not believe it to be a function of this society to settle such matters for manufacturers and am unable to see how the society could act without conflicting with Article X of the constitution which states in effect:

> "Recommendation, endorsement or approval shall not be given to or made for———any mechanical or engineering production."

The opinion of the society must not carry with it the promotion of the interests of any individual, firm or corporation.

Aside from the question of constitutionality, it seems to me that this committee would be literally swamped with work in case the recommendation of the committee is adopted and the manufacturers show a desire to take advantage of its provisions. Would there not be likely to be great delay in establishing ratings in this manner?

It seems to me that such a committee as the one proposed could hardly transact its business by correspondence. The holding of meetings with sufficient frequency to pass on questions that may arise in connection with boiler ratings, it seems to me would be difficult to accomplish.

As to the test code offered, I believe it is well to bear in mind the vote under which this work has been done, viz., that "in the absence of any standard for rating steam and hot water heating boilers one should be established based on coal consumed per square foot of grate surface and efficiency."

While the complete code and perhaps a still more complete one may be desirable, I believe that a shorter one will fully comply with the vote. Items 8, 9, 10, 19, 23, 29 and 32, while interesting and desirable, could, I believe, be omitted and still comply with the vote.

It seems to me (1) that the steam pressure should be stated, (2) that it should be mentioned whether or not boiler is covered, (3) that the amount of priming or moisture in the steam should be limited to a certain per cent., (4) that the efficiency should be worked out and stated.

This committee has secured interesting and valuable data, but I do not believe has fully or finally solved the problem.

With the data secured and the discussions at this and the Indianapolis meeting before it, I believe a new committee to be appointed by the president, elect, to which I hope this matter will be referred, will be in a position to further the work and bring the matter to a satisfactory conclusion.

Mr. E. A. May spoke against the adoption of the majority report, on the ground that it was unwise for the society to adopt any formula and call it a standard. Prof. Carpenter discussed the reports, and said, "Mr. Seward has given us a practical method of rating these boilers. I doubt whether the majority report has." On motion of Mr. Macon, amended by Mr. Weinshank, and further amended by Mr. H. A. Smith, it was finally voted to receive all four of the so-called reports and turn them over to a new committee, which should proceed farther along the same lines and report at the next meeting.

The session closed with a report of the Review Committee on Heating Boilers, P. H. Seward, chairman, in which the author codified and indexed the matter on this subject which has appeared in the society's Proceedings.

Wednesday Afternoon, January 19

The Wednesday afternoon session opened with a discussion of Topic No. 1, "Methods for Testing House Heating Boilers to Get the Most Accurate Data." Mr. E. A. May, of the American Radiator Co., described the methods employed by his company for testing boilers.

Samuel R. Lewis, chairman of the Committee on Air Washers, then presented the following report:

*The Permanent Place of the Air Washer in Heating and Ventilating Work**

It is admitted that the purification of air is vital, and that the engineering connected therewith is most important and interesting. Ever since there have been any attempts made to ventilate buildings efforts have been made also to remove the impurities from the air admitted. With the congestion of population in cities and the burning of bituminous coal it has become even more important to cleanse the air. With the wide use of fans for ventilation and the accompanying high air inlet velocities, quantities of dust and soot are pulled in, and unless arrested and disposed of they reach and pollute the ventilated apartments. Almost every conceivable type of apparatus for removing the dirt has been tried. It is highly desirable also to purify the air by removing objectionable gases and odors. Dry filters of wire and cloth are in use. To be permanently effective they must be cleaned continuously, or they merely hold up

*From the report of the Committee on Air Washers, read at the annual meeting of the American Society of Heating and Ventilating Engineers, New York, Jan. 18-20, 1910.

the impurities so that they may contaminate more air, and very soon become so clogged that the free area is curtailed.

DRY FILTERS

A cleaner of this type is now on the market, and consists of a series of wire screens, over the inlet side of which hollow slotted suction arms under a considerable vacuum are constantly rotated. The vacuum is induced by means of a small centrifugal exhauster, and the screens, thus kept free from clogging, are maintained at their highest efficiency. This type is very economical in operation, as it does not require any preliminary tempering coils, and the maintenance of the vacuum is a trifling expense. This cleaner does not affect the temperature or humidity of the air, and is therefore advantageous in many respects. It appears doubtful whether or not it will eliminate from the entering air all minute particles of dust, but has without question an efficiency high enough to justify its installation in many buildings.

Cheesecloth bags in the air inlets to gravity indirect plants in even the residence sections of cities will often become black and so clogged that they become practically inoperative in 24 hours. However, if designed with ample free area, and changed every few hours, they are very effective in removing dirt and soot. The bag type seems to give the greatest free area in a given space of any cheesecloth cleaner. The bags should be made of inexpensive material, and when removed should be burned.

There is a dry air cleaner on the market which is composed of a sheet or belt of heavy special cloth, which is supported on zigzag frames, and is so designed as to present a very large surface to the passage of air. The velocity through this substance must be very low, and the space required renders it a difficult task to find room for its installation in ordinary cases, especially where air for ventilation is to be cleaned. This type is, however, especially adapted for filtering air used in manufacturing processes, on the suction inlets to air compressors, for cleaning the air used in cooling electrical machinery or for cleaning the gas entering internal combustion engines. Notice is sure to be given, by greatly reduced air volume due to clogging, when this type requires cleaning. The thickness and mesh of the fabric are capable of considerable variation, to fit the special requirements of the installation.

Where expense of installation and maintenance is of no importance as compared with results, filters of cotton fiber loosely held within wire frames are in use. The air velocity is kept so low as to be almost imperceptible. The cotton is removed as it becomes soiled, by an attendant whose time is practically fully occupied by this duty. Such an installation must have a very high efficiency.

AIR FILTERS USING WATER

There are many types of air cleaners which use water. When water is used over a screen of sufficiently fine mesh for the screen to be effective, the water closes the interstices in the screen and reduces the free area. Coke has been used, being held in trays of wire, with water running over the whole. The pores of the coke soon becomes clogged and the whole mass becomes slimy and unspeakably foul, when it is a tedious and expensive task to remove it and refill the trays with new material. This type of cleaner also produces considerable resistance to the flow of the air. Various other expedients have been used, such as ropes of fiber running as endless belts through a pan of water, the air being drawn between the dripping ropes. With such types there is apparently not enough impinging area, and, like the coke type, the maintenance cost is high.

MODERN TYPES OF AIR WASHERS

Gradually there has developed a type of cleaner in which the air is first drawn through a chamber in which it meets with a spray of water, then through a battery of baffle plates which are so arranged that little, if any, of the water can pass. Many of

the devices and processes of this type of cleaner are covered by patents.

To a large extent, we believe the principle which makes one effective makes all more or less effective. The baffle plates may be vertical or horizontal, curved, angled or hooked, and in their construction lies the secret of the results attained. These water cleaners, if they would be economical, must have pumps to recirculate the water, as the large quantities used would be expensive if handled but once. If the cleaner is effective, or if there is enough dirt in the air to make it worth while to run the cleaner, this water must be frequently renewed. The cost of running the circulating pump is nominal. The process of securing an intimate contact between the air and water is very important, and there are many patented forms of spray heads and other devices for accomplishing this.

As at present manufactured by a number of firms, this water type of cleaner consists of—

1. A tempering coil which raises the temperature of the incoming air above the freezing point, or steam coils which heat the circulating water to such an extent that it will not be frozen. It is always advisable that these heaters be automatically controlled.

2. A spray chamber and tank built of copper, galvanized sheet iron or concrete. In this chamber are spray heads, perforated pipes, overflowing troughs or other devices for securing an intimate contact of the air with the circulating water. In some types the water merely falls from the ceilings; in others, is sprayed in thin sheets at right angles to the air current; in others, falls like rain over the edges of troughs at right angles to the air, or runs over coarse-meshed screens.

In some the spray heads open periodically and are automatically flushed out, and in others this flushing must be done manually from outside the chamber. In some, lamentably, it is necessary to shut down and go at each spray with a screwdriver. Others are so built that they cannot possibly clog. One device combines the spray chambers with a fan wheel, using centrifugal force for mixing air and water and finally for separating them.

3. An eliminator, built generally of galvanized iron or copper. This seems to operate on the same principle as most steam separators, in that by sudden changes of direction the air passes on, but the particles of moisture and accompanying dirt impinge on the wet surfaces and drain to the tank through channels provided for the purpose. The shape, size and general design of this part of all air washers seems to be a crucial point. Part of this surface apparently should be passed by the air at high speed, so as to slap the particles of dirt against the wet plates. Part should be passed more slowly, so that as much of the moisture as possible may be deposited.

It seems not inappropriate here to insert some suggestions made by a prominent engineer as to improvement in the water type of air cleaner, as regards both its manufacture and installation. Nearly all the devices now made could be equipped to conform with these suggestions. The expense would be somewhat increased by porcelain enameled construction, but cleaning would be greatly facilitated, sanitary condition much improved and everlasting construction attained.

"1. Proper spray chambers and eliminator chambers, with walls of material impervious to moisture, readily cleaned by hand, the surface to be similar to the vitreous material used for plumbing fixtures.

"2. The eliminator vanes to be made of similar material and made easily removable for cleaning and repairs.

"3. Each spray chamber to be provided with artificial lighting apparatus, so that the operator may observe the condition of the chamber.

"4. The cleaning devices for spray nozzles to be arranged so as to operate from the outside of the washer as readily as try-cocks of a boiler are operated.

"5. The settling tanks containing the water in the bottom of the air washers to be made of the same material as the walls of the spray cham-

bers, above described, so as to be easily flushed and cleaned.

"6. Each manufacturer to furnish directions on a metal plate, indicating to the operator the several duties to be performed in order to care for the apparatus properly.

"7. Manufacturers to furnish with every device a reliable dial thermometer (cost about $30) which will indicate the temperature of the spray chamber; also, a reliable dial thermometer which will indicate the temperature of the tempered air chamber, so that the operator can tell whether the automatic temperature control devices are maintaining the proper temperature in each respective chamber, without going into said chambers.

As the gentleman making these suggestions probably has installed as many air washers as any individual not a manufacturer of them, his suggestions should be given consideration.

Every eliminator baffle plate ought to be accessible for cleaning at every joint and crevice. At present, apparently, it is impossible thoroughly to scrub down the interior baffles of many makes. Some of the manufacturers have recognized this feature and provided easily removable baffles.

Perhaps one of the greatest fields of activity for water air cleaners or air washers is along the line of humidity control.

Some of these modern air washers, with the various devices attached governing the temperature and volume of air and water, are able to maintain, automatically, any desired reasonable relation between temperature and humidity, day by day, season by season, and their field of usefulness along this line is, we believe, just begun.

It is not uncommon to hear criticisms by persons interested of the guarantees imposed in specifications for air washers. Therefore, the following is suggested as being a form of guarantee probably not beyond the bounds of reason, and still one that will insure the owner a fair return for his investment.

PROPOSED FORM OF GUARANTEE

a. The machine shall be of sufficient capacity when handling —— cu. ft. of air per minute to remove not less than 98% of the solid matter entering the same.

b. To cool the incoming air when circulating water, that the outgoing water and air temperature differences will not be more than a percentage named and guaranteed by the manufacturer, of the incoming water and air temperature differences.

c. In winter automatically to control the absolute humidity of the air leaving the machine within one-half grain of moisture per cubic foot.

SIZE AND COST OF DIFFERENT TYPES

We have endeavored to compile some approximate data as to sizes and cost of the different types. This is of necessity approximate. Eight makers of air cleaners were interrogated. Five replied to part of the questions, while the balance refused to answer or feared to divulge trade secrets.

The questions were as follows:

"For quick use in estimating, the following information might be of value if the average of a large number of replies were used. If you will fill out the following blank, an attempt will be made to tabulate the averages.

"For a standard air cleaner to be used, say, in a bank, and handling, say, 25,000 cu. ft. per minute. All replies are of course approximate."

1. Cubic feet of space occupied per 1,000 cu. ft. per minute handled? The answers were 16—22—17½—15—13½.

2. Square feet of floor space occupied per 1,000 cu. ft. per minute handled? The answers were 5.3—1.4—1.68—11—2—1.3.

3. Power consumed by pumps or machinery an integral part of apparatus per 1,000 cu. ft. per minute handled? The answers were 0.06—0.1—.05—.075—0.2.

4. Weight of complete apparatus in running condition per 1,000 cu. ft. per minute handled? The answers were 120—150—100—200—75.

5. Cost of apparatus installed in place, under ordinary conditions, per 1,000 cu. ft. per minute handled? The

answers were $25.00, $28.50, $24.00, $34.00, $40.00.

It is feared that these answers are too few to make up an average of much quality, and the conditions may be so varied that the answers are not dependable. It would, however, appear that a serviceable air washer of about 25,000 cu. ft. capacity per min. can be erected in a space containing about 500 cu. ft., on about 50 sq. ft. of floor, and that less than 2 H. P. will be required, while the apparatus will weigh somewhere in the neighborhood of 3,600 lbs. and cost probably not more than $800.

The committee wishes to acknowledge the suggestions and valuable criticisms of several air washer manufacturers, and to state that the committee, having investigated to some extent, appreciates the reasons of these manufacturers for being reticent as to results of tests in their own laboratories.

S. R. Lewis, Chairman;
Bert C. Davis,
Thomas Barwick,
R. P. Bolton,
James Mackay,
Committee.

The paper by J. Jeffreys, of London, Eng., on "A Method of Determining the Sizes of the Pipes of a Hot Water Apparatus," was read in abstract by Mr. Macon. It will be published in The Heating and Ventilating Magazine for March.

Review committee reports were then presented, including one on hot water heating, by William M. Mackay; one on steam heating small buildings, by Charles F. Newport; and one on furnace heating, by James D. Hoffman.

The remainder of the session was taken up with topical discussion of Topics 2 and 3.

Thursday Morning, January 20

The morning session was opened with the reading of a paper by Prof. William Kent on "Performance of Heating Guarantees."

During the ensuing discussion, which turned on the matter of air velocities in connection with guarantees of heating systems, resulting in air leakage around windows, it was voted, on motion of D. M. Quay, to appoint a committee to gather data upon this subject.

Review committee reports were then read, including one on tests, by D. D. Kimball.

At this point the regular order was suspended to permit the reading of the report of the Committee on the Relative Corrosion of Wrought Iron and Steel Pipes, T. N. Thomson, chairman. This report was read by James A. Donnelly, and will be published in a later issue.

Special review committee reports on standards, R. C. Carpenter; fans and fan systems, B. S. Harrison; and radiators and heaters, W. W. Macon, were not in shape for presentation and were held over.

Relative Efficiency of Exhaust and Live Steam

A lengthy discussion of Topic 5 followed on "The Relative Efficiency of Exhaust and Live Steam." The discussion was opened by D. D. Kimball quoting from The Heating and Ventilating Magazine a statement to the effect that exhaust steam is better than live steam for heating purposes. This view was endorsed by Mr. Kimball and strongly supported by many of the other speakers in a prolonged discussion which was carried over into the afternoon session.

Thursday Afternoon, January 20

Following the discussion of Topic 5, a paper was read by H. W. Whitten on "Variability of Interior Conditions in School Rooms."

At this point the newly elected officers were installed, and President James D. Hoffman took the chair.

John F. Hale, chairman of the Review Committee on Compulsory Legislation, read a most interesting report which brought forth applause in recognition of the labor involved in its preparation as well as the valuable information it contained. It is presented on page 27.

The review committee report on ventilation by Thomas Barwick was deferred to another meeting, as it was not in shape for presentation.

Of the other review reports, that on central heating plants, John R. Allen, chairman, was read by Ralph A. Collamore; that on electric heating, T. N. Thomson, chairman, was read by Mr. Macon; and that on steam heating for large buildings was read by the chairman, John F. Hale.

Mr. Snow then made the necessary motions for the continuance of many of the special committees which had not as yet finished their work.

The report of the Publicity Committee, which was then called for, brought out an expression of opinion that great care should be exercised in the work of the committee to avoid unduly advancing the interests of manufacturers of patented ventilating devices.

Topical discussion occupied the remainder of the session, and brought the meeting to final adjournment.

Heating Engineers' Annual Dinner

A formal programme of speakers and subjects was the feature of this year's dinner of the heating engineers, which was held on the second evening of the annual meeting, January 19, at the New Grand Hotel, New York. The success of the professional sessions was reflected in the large attendance at the dinner which proved a highly successful affair.

Acting as toastmaster, President William G. Snow arose after a well-prepared menu had been disposed of and introduced as the first speaker, Prof. Charles R. Richards, president of the National Society for the Promotion of Industrial Education.

Prof. Richards took as his subject "Industrial Education." "The apprenticeship system," he said, "was a natural one under the old conditions of employment. The system has not disappeared, but ever since the factory system of organization has been in effect, the apprenticeship system has been lame and halting. Wherever capital has entered industrial activity, there are no longer those old conditions of the training of the boy. Twenty-four years ago the first trade school was established, but only 12 new ones have been established since that time.

"Anything that reaches the large masses has got to come under public supervision. At present the trade schools do not reach the masses of workers.

"Large numbers of boys and girls in the secondary schools leave school before graduation. In New York state, not more than 65 per cent. of the students graduate and in New York City the percentage is somewhat smaller. The boys who leave school at 14 years of age do not get into the high-skilled industries. They go into the 'closed-end' occupations. In the latter case, the two years between 14 and 16 are demoralizing to the last degree, yet it is from these boys that the large class of industrial workers comes from. Such workers are not recruited from the graduates of high schools.

"Thus this whole question is related to the child labor movement, but the child labor movement is merely a negative movement. What we need is a positive and constructive movement. The development of schools is needed that will help such boys as leave the public school before graduation. They may be vocational schools, designed to teach the boy who does not stay in the grammar school. Such subjects should be taught as shop mathematics, shop drawing and shop management. Such a school also must work upon a product that is worth while. It should be one of production. This would be a new proposition in American education, embracing what might be termed preparatory trade schools.

"It is interesting to note the change of attitude toward apprentices on the part of organized labor within the last three or four years. Labor leaders are commencing to realize that the training of the apprentice is a thing that must be reckoned with and a thing that has come to stay. They now advocate supplementary education and have nothing to say against trade schools."

President-elect James D. Hoffman, speaking on "The Needs of the Society," said he felt that advice should come from the other side but that he stood ready to accept all the necessary responsibility for the progress of the society under his administration. "Organization," he continued, "rather than self-preservation, is one of the first laws of nature. The duties of members are three-fold. First, to themselves; second, to their associates, and third, to the society of which they are a part. Members should become acquainted with the transactions of the society so that they may know what has been done. The spirit of coöperation is in this society, but is it as much as it should be? The society has a duty to its members. It also has a duty to the public. The organization

(*Continued on page* 32)

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IN THE enthusiasm aroused by the practical character of the work before it, those interested in promoting a campaign of publicity for better heating and ventilation methods have given scant attention to what is likely to prove its most serious obstacle. It is almost inevitable that any extended public agitation of the principles of heating and ventilation will involve a discussion of particular methods and devices, so that the commercial aspect, if not scrupulously kept in the background, may easily gain undue prominence. The public, as a body, is profoundly ignorant of the strides that have been made in the general practice of heating and ventilation, and publicity may well be confined to such features as what constitutes good ventilation, examples of the other kind, and how, in industrial establishments, proper methods will bring a return, in dollars and cents, to the proprietors in improved and more efficient workmanship on the part of employees under their control.

SOME of the difficulties involved in formulating a basis for a standard rating of house heating boilers may be seen from the varied views on the subject expressed at the recent meeting of the heating engineers. In addition to the majority report of a committee on the subject, the presentation of what constituted four minority reports, was enough in itself to preclude the adoption of any one of them. The new committee that will carry the work on from the point already reached will have the advantage, not only of the previous committee's work, but, also, of the extended discussion and many admonitory "don'ts" that indicated the varying opinions held of the plan proposed by the majority of the committee.

More mature consideration brought out one point very clearly, and that is that an engineering society takes a very radical step in attempting to establish any standard. It was pointed out that so important a body as The American Society of Mechanical Engineers has yet to formulate a standard, this body contenting itself with recommending a standard which may or may not be adopted by the trade or profession. The test, in that case, comes in connection with the merit of the recommendation itself, and the fact that so many of the mechanical engineers' recommendations are generally accepted is the proof of their correctness. It is highly probable that the final report of the committee on the rating of house heating boilers will contain a recommendation that the heating engineers' society publish its basis for such ratings as a recommendation only to manufacturers, leaving it to the latter to determine whether the recommendation shall become a definite standard.

High Pressure Steam Piping

PART II

Figuring Economical Steam Velocities

BY PERRY WEST, M.E.

In designing anything it is generally well to start with the figures or calculations, and with piping it is the approximate sizes which are needed first. With these sizes well in mind, the scheme may be laid out, after which the final plans and details may be completed.

The preliminary sizes are determined by using the commonly accepted velocities of flow, which are usually quite accurate enough for this purpose. For preliminary pipe sizes and layouts the following velocities may be used: 6,000 ft. per minute and 8,000 ft. per minute for saturated and superheated steam, respectively. From the pipe sizes thus obtained, the amount of space to be occupied by the piping, together with its general arrangement and provisions for flexibility, may be approximated.

The economical size for any pipe is that at which the sum of all losses and charges is a minimum. Generally speaking, these losses and charges consist of those from friction, radiation and fixed charges. Losses from velocity head will be neglected here, due to their comparative insignificance.

LOSS FROM FRICTION

Of the frictional loss, we are principally interested in the drop in pressure which this may cause at the end of the line, and its consequent detriment to efficiency. The heat of friction, which should be equivalent to the energy lost in friction, has some value toward the offsetting of this loss. In other words, this heat may either wholly or partially counteract the condensation in saturated steam lines, or it may add to the superheat in superheated lines. The reduction of pressure may also otherwise tend to superheat the steam due to wiredrawing.

Properly speaking, this additional heat should be credited against the frictional losses, but with the present status of experimental data this is impracticable. Of the experiments noted, those for the determination of frictional drop in pressure do not seem to comprehend the corresponding temperature changes; nor do those for determining temperature changes comprehend the corresponding frictional drop in pressure. An exhaustive series of experiments determining the corelation of these factors and at the same time eliminating the effects on same of the heat transfer through the walls of the pipe would be a very welcome link in the scientific study of pipe sizes.

For the purposes of this paper no further account will be taken of this heat of friction except to say that in the absence of exact data it may at least be borne in mind as a factor in favor of higher velocities than might otherwise be selected.

The accepted formula for expressing the friction head in steam pipes may be written as follows:

$$H' = f \frac{2v^2}{gdWL},$$

where

d = Diameter of pipe in feet,
L = Length of pipe in feet (or L' its equivalent in effective length, when ells and globe valves are included),
v = Velocity in feet per second,
W = Pounds of steam flowing per hour.

This friction head may be reduced to pressure in pounds per square inch,

$$p = 0.000131\left(1+\frac{3.6}{d}\right)\left(\frac{w'L}{Dd'^5}\right), \quad (1)$$

where

p = Frictional loss in pounds per square inch,
D = Density of the steam in pounds per cubic foot,
d' = Diameter of the pipe in inches,
w' = Pounds of steam flowing per minute.

The frictional drop through easy bends, such as standard pipe bends, may be taken equal to that through the same length of straight pipe. The drop through standard radius ells and through globe valves may be taken as equivalent to that through a certain length of straight pipe. In figuring the drop through a pipe line, including bends, ells and globes, it is necessary, therefore, to increase L by an amount equal to the length of bends plus an equivalent for the ells and globes. This equivalent is given from the latest experiments as follows:

For 90-degree ells,

$$520\,d' \div \left(1 + \frac{3.6}{d'}\right)$$

For globe valves,

$$706\,d' \div \left(1 + \frac{3.6}{d'}\right),$$

where d' = diameter of pipe in inches.

The L' used in succeeding formulas shall be understood to include these additions, and may be termed the effective length in place of the actual length of the pipe line under consideration.

RADIATION LOSSES

The radiation losses in B. T. U. per hour may be represented by the following formula:

$$U = \pi\, d''\, L\, c\, (T - T_0),$$

where

d'' = Outside diameter of pipe in inches,
c = Constant,
T_s = Temperature of steam,
T_0 = Temperature of the room.

For 2½-in. 85% magnesia covering applied in two standard layers according to the best practice, c may be taken equal to 0.35. The character of insulation will, of course, determine the value for c in each particular case. It may be taken to vary inversely as the square root of the thickness of the insulation. This value of 0.35 for c gives a corresponding value for

$$U = 0.09\, d''\, L\, (T_s - T_0). \quad (2)$$

FIXED CHARGES

These may be considered as being composed of interest, depreciation, taxes and maintenance. The proposed life of the piping, its character and the service to be imposed will determine to a large extent the percentage to be allowed for depreciation and maintenance. Ordinarily 20% of the first cost is a fair allowance for covering the fixed charges, and will be used here.

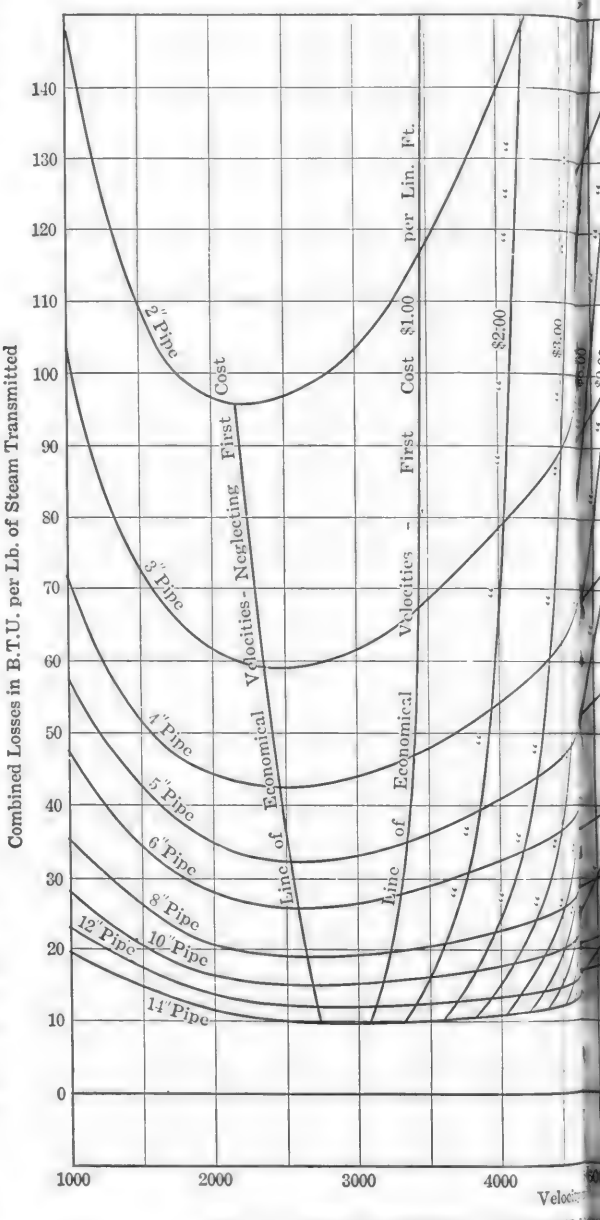


FIG. 2—CHART SHOWING COMBINED L... OF HIG...

Steam pressure: 100 lbs ...
B. T. U. loss per square ...
For 150 lbs. steam pressu...
For 200 lbs. steam pressu...
For condensing conditions ...

A COMMON UNIT BASIS FOR LOSSES

In order to compare these several losses and charges, it is first necessary to bring them to a common unit basis. For this purpose the B. T. U. loss per pound of steam transmitted is perhaps the most convenient unit. The primary effect of drop in pressure is to increase the steam consumption in the engine cylinder and to decrease economy at this point. The percentage of this effect per pound drop will depend more or less upon conditions, such as: initial pressure, exhaust pressure, B. T. U. loss in the rejected steam, and the relative efficiency of the cylinder throughout the different ranges of pressures and temperatures. The effect of a 1-lb. drop is less, therefore, with high than with low initial pressures, and greater for non-condensing than for condensing conditions, other things being equal.

TION AND RADIATION PER 1,000 FEET
AM PIPE

er degree difference=0.35
al velocity by 1.37
al velocity by 1.66
l velocity by 1.25

Since increasing the steam consumption of an engine multiplies the total B. T. U. loss in the rejected steam, the effect of drop increases with the losses between the cylinder and the boiler. The drop not only causes a loss equal to the difference in the number of B. T. U. contained in the steam at the different pressures, but is responsible also for all heat losses due to the increased consumption.

The temperature entropy is the best method of arriving at the effect of drop upon steam consumption. For the purposes of this paper the thermal efficiency of the cylinder is taken as uniform. This latter assumption, while not true for wide ranges, is believed to be amply correct throughout ranges corresponding to the ordinary drop of pressure in steam pipes. After determining the increase in the steam consumption, the next step is to reduce this to its equivalent in B. T. U. loss per pound of steam supplied or transmitted. This is done by subtracting the heat units returned to the boiler from the total heat of the steam and multiplying by the increase per pound in the consumption, as determined from the temperature entropy equivalent of drop in pressure.

The B. T. U. loss by radiation per pound of steam transmitted is equal to the total loss by radiation divided by the number of pounds transmitted. With formulas Nos. 1 and 2 and the above data as a basis, Fig. 1 has been made up, covering the losses in 1,000 ft. of different sizes of pipe for different velocities and an initial pressure of 100 lbs. absolute. This curve sheet

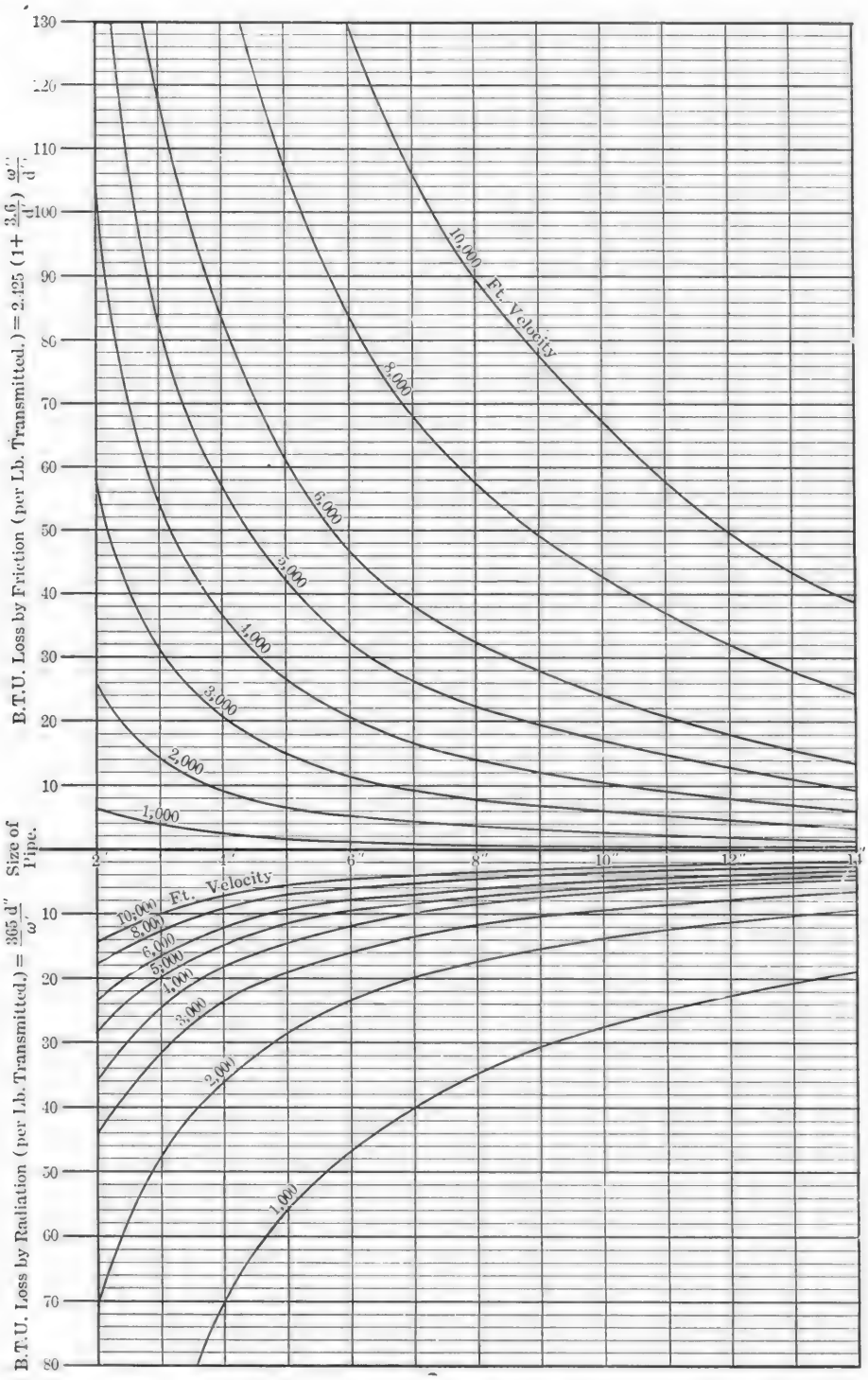


FIG. 1. CHART SHOWING LOSSES BY FRICTION AND RADIATION PER 1,000 FEET OF HIGH PRESSURE STEAM PIPE

Steam Pressure=100 lbs. Absolute.
B. T. U. Loss per sq. ft. of Pipe per Hour per Degree Difference=0.35.
Equivalent of 1 lb. drop=4.85 B. T. U. per Pound Transmitted.

is based on non-condensing conditions.

Fig. 2 shows corresponding combined losses for non-condensing conditions. The line joining the lowest points of these combined loss curves is the line of most economical velocities as far as frictional and radiation losses are concerned, only.

The other curved lines in Fig. 2, running more or less parallel to and on the right of the line just mentioned, are the lines of most economical velocities, taking into account the fixed charges on the piping at different first costs per linear foot. In making up these latter curves the fixed charge is figured at 20% per year on the first cost and reduced to its equivalent in B. T. U. loss per pound of steam transmitted. In this transformation coal is figured at $3 per ton, and as delivering 10,000 B. T. U. per pound to the steam.

Or, in other words, fixed charges are figured as being equivalent to

$$U'' = [0.2\left(\frac{ZL}{3}\right)2000\times 1000]\div$$

$$[w'\times 60\times 24\times 365] = Z\frac{2.536}{w'},$$

where Z equals cost of pipe in dollars per linear foot. The total charges against the piping may be taken, therefore, as being equivalent to

$$K\left[0.000131\left(1+\frac{3.6}{d'}\right)\left(\frac{w'^2 L'}{D d'^5}\right)\right]+$$

$$\left[\frac{0.09\, d'' L(T_s - T_a)}{w'}\right]+\left[Z\frac{2.536\, L}{w'}\right]$$

in B. T. U. per pound of steam transmitted. In this formula K equals the equivalent of 1 lb. drop in pressure in B. T. U. per pound of steam transmitted.

By substituting proper values corresponding to different diameters, pressures and prices per foot of piping, and solving for a minimum, values of w' are gotten corresponding to the most economical velocities as shown by the curves. For other unit prices of coal and different boiler efficiencies, corresponding alterations should be made in the formula and curves drawn to suit. The values selected are intended to represent average conditions and will no doubt prove accurate enough for ordinary purposes.

Attention is drawn in connection with all curves to the fact that L' is taken as being equal to L, or, in other words, no allowance is made for friction added by bends and valves. In cases involving a number of sharp bends and globes, special solutions and extra curves must be resorted to for accurate results.

In cases where the plant is intended to operate for portions only of the 24 hours per day, or of the 365 days per year, the first cost of piping may be multiplied by 8,760 (the number of hours in a year) and divided by the number of hours of actual operation per year, and this result be used instead of the actual cost of the piping. A similar correction may be made when a fixed charge other than 20% of first cost is to be used, by multiplying the first cost by the number of desired per cent. and dividing by 20, using the result in place of the actual first cost. Or both of the above corrections may be made when necessary, one after the other.

Attention is also invited, in connection with all the curves, to the fact that they are figured for a continuous unity load factor. For variable loads the economical velocities given should be multiplied by a factor to be determined from the load curve. Considerable judgment is required in selecting this factor accurately without going through a series of laborious calculations. If very accurate results are required, the several losses must be figured separately for each load, in which case the curves can be of little assistance. For ordinary purposes, however, a factor can no doubt be selected which will prove accurate enough for practice. For load curves with but little fluctuation this factor might be made equal to the maximum load divided by the average load. For load curves with great variations a factor may be used equal to the quotient gotten by dividing (one-half the square root of the mean square load plus one-half the average load) into the maximum load. The curve sheets are self-explanatory as to their use.

For other than 100-lb. initial pressures, factors are given on the curve

Pipe Diam., Ins.	Normal Capacity of Station, Kw.	750	2,000	7,500	7,500	80,000	1,600
2	Total length of pipe.....Feet	30	16	.....	70	.....	80
	Cost per lin. foot.....	$1.32	14.00	.....	12.50	.....	2.15
2½	Total length of pipe.....Feet	.....	33	.....	40	.....	.....
	Cost per lin. foot.....	.....	$8.10	.....	4.80	.....	.....
3	Total length of pipe.....Feet	23	.....	.....	150	.....	55
	Cost per lin. foot.....	$2.60	.....	.....	1.80	.....	5.00
3½	Total length of pipe.....Feet	.....	57	.....	.....	.....	.....
	Cost per lin. foot.....	.....	$4.20	.....	.....	.....	.....
4	Total length of pipe.....Feet	35	34	.....	150	.....	130
	Cost per lin. foot.....	$3.60	4.40	.....	8.00	.....	3.30
4½	Total length of pipe.....Feet	.....	40	.....	.....	.....	.....
	Cost per lin. foot.....	.....	$8.75	.....	.....	.....	.....
5	Total length of pipe.....Feet	30	130	.....	30	.....	.....
	Cost per lin. foot.....	$14.33	6.75	.....	15.00	.....	.....
6	Total length of pipe.....Feet	16	112	.....	90	.....	45
	Cost per lin. foot.....	$13.35	8.50	.....	14.00	.....	6.00
7	Total length of pipe.....Feet	.....	25	.....	.....	.....	.....
	Cost per lin. foot.....	.....	$20.00	.....	.....	.....	.....
8	Total length of pipe.....Feet	.....	20	150	.....	2,000	25
	Cost per lin. foot.....	.....	$19.00	17.60	.....	27.00	9.80
10	Total length of pipe.....Feet	20	.....	100	.....	.....	.....
	Cost per lin. foot.....	$9.60	.....	5.65	.....	.....	.....
12	Total length of pipe.....Feet	.....	.....	120	.....	1,400	.....
	Cost per lin. foot.....	.....	.....	18.60	.....	11.00	.....
14	Total length of pipe.....Feet	.....	.....	.....	.....	1,280	.....
	Cost per lin. foot.....	.....	.....	.....	.....	$23.00	.....

Note.—Above costs include erection and covering complete in place.

sheet by which the economical velocities shown for 100 lbs. are to be multiplied to get economical velocities for the other pressures. Results gotten by using these factors are accurate within about 2%, which is close enough for this work. A similar factor is given for converting the economical velocities shown for non-condensing conditions to corresponding values for condensing conditions. Owing to the number and variable character of the factors entering into the problem of determining the economical velocities, it is practically impossible to construct a simple set of curves covering all cases. The curves shown, it is believed, will, with a little experience and judgment in their use, cover a number of cases in a practical way.

The influences of the cost of piping upon economical velocities is shown by the curves. The accompanying table has been prepared to show the variation in cost of pipe work in some representative plants of several different types and sizes. The wide difference in cost for the same size of pipe in different plants illustrates very plainly the value of close preliminary estimating on first costs before selecting velocities. In connection with the application of the curves to any system of high-pressure piping, each section, main or branch may be treated separately. Changes in velocity, either from a higher to a lower velocity or *vice versa*, are inadvisable, and the figured velocities should be adjusted so as to be nearly uniform throughout any one system.

American Society of Mechanical Engineers

Birmingham, England, has been selected as the place for holding the forthcoming joint meeting of the American Society of Mechanical Engineers and the Institution (British) of Mechanical Engineers. The dates are July 26-29, 1910. The Celtic of the White Star Line has been selected as the official steamer for carrying the American delegation. The Celtic will sail July 16 for Liverpool and the committee in charge announces a reduction to members of 10 per cent. in the regular tariff rates, except where such a rebate would cause the price of passage to fall below $97.50, the fixed minimum rate. Among those who have signified their intention of attending the Birmingham meeting are William J. Baldwin, New York; Edward P. Bates, Syracuse, N. Y.; R. P. Bolton, New York, and William T. Donnelly, New York.

The Effect of Superheated Steam on Cast-Iron and Steel

(*Continued from December*, 1909)

Cast Iron Valves and Fittings for Superheated Steam

By Arthur S. Mann, Schenectady, N. Y.

There have been many failures of cast iron valves and fittings in piping systems carrying steam of high pressure and high superheat. The ordinary extra heavy flanged cast iron fittings which are listed in many manufacturers' catalogues as suitable for 200 lbs. pressure and which have to meet a close price competition, have successfully carried a pressure perhaps as high as 150 lbs. or more. No doubt the fittings and valves can support a steady pressure of 200 lbs. without bursting, but there have been many failures when carrying superheated steam of lower pressure.

These fittings are not too well suited for permanent work of even 150 lbs. pressure, and many engineers in control of such matters in stations of a representative type prefer to design their own parts rather than to trust the usual run of commercial extra heavy fittings.

Probably on account of the advertised ability to support a high steady pressure these extra heavy fittings and valves have been used in a number of instances for superheated work. After a short time, six months or even less perhaps, cracks make their appearance; valves leak, seats become loose, castings grow in length and surface cracks become so large in size and in number that the casting is removed from the line.

A few repetitions of this experience seem to justify the conclusion that cast iron is not fit material for high temperature steam. The natural substitute is steel, which is used with fair, even complete, success in many cases.

It is known that cast iron will grow with repeated heatings and coolings, often observed in the ordinary straight grate bar. When the bar is first heated it expands and cools as it contracts; but if the temperature has been high, the bar will increase in length. With a second heating, a further increase takes place, followed by many others. As a consequence the long single, straight, flat grate warps and proves the wisdom of McClave's rule, "Keep your long lines of metal away from the fire."

A rough experiment on this line was tried by the writer with two samples, one of an ordinary cast iron and a second of a high grade cast iron, which has proved itself capable of carrying superheated steam, and of which a detailed analysis is given in this paper. The two samples were each 6 in. long and 1 in. in diameter. They were placed in a banked fire over night, reaching a dull red heat, and were allowed to cool in the air. A slight growth as measured by micrometer was found in each piece.

This treatment was followed for two or three nights and the growths were measured. There was an increase in the length of each of the samples, the high grade iron having increased in length slightly more than did the ordinary iron. The experiment so far as it went tended to show that the growth of cast iron does not necessarily unfit it for the usual degree of superheat in power house work.

Many grades of brass will crumble when heated in a forge to a barely visible red, and are quite unfitted to support any stress at such a temperature. But this characteristic in no way unfits very ordinary cast brass for saturated steam work, and one should not hesitate to use a valve of cast brass up to 3 in. in diameter for 150 lbs. saturated steam pressure. Three inches is not usually exceeded because valves of large brass bodies are expensive.

Articles have appeared in various publications showing the disability of cast iron, tensile tests being made before and after the use of fittings of ordinary iron. Cases of bronze seats dropping from valves were cited, and it was not difficult to prove that something better than ordinary cast iron was needed for steam of 180 lbs. pressure and 250° superheat. These failures came from two causes. In the first place the iron itself was not of sufficiently good quality; and, secondly, the parts were not thick enough. The static stress probably did not exceed 1,000 lbs. in the body; but static stress is not the important load which fittings have to support.

Stresses from expansion and contraction within and without the casting, and stresses from pulling up joints no doubt greatly exceed the static load even in pipe very carefully erected. The troubles are aggravated by the action of the steam itself, but it is yet to be proved that the steam or its high temperature will of itself start cracks in a properly designed fitting.

Within the experience of the writer steel fittings have failed with superheated steam. Out of twenty-five steel gate valves, 6, 8 and 10 in. in diameter, not more than four were fairly tight after one year's service, the bodies themselves yielding enough to leak badly. Some defects in the castings developed, allowing steam to pass straight through the walls, when they left the foundry. Some

of these defects were such that the fittings and valves could not be repaired. In some cases seats were scraped in once or twice and holes were plugged up or patched, but the material would not have been satisfactory without this working over. Yet all these castings were heavy, materially thicker than the commercially extra heavy cast iron product, and had passed a rigid inspection.

Fig. 1 shows a 10-in. steel fitting; the irregular line at A showing a defect developed after use. The line does not pass clear through the casting, and no doubt the piece was amply strong to resist rupture even after the fault developed. Some of these fissures went 3 in. back and were 5 in. broad. Such a large opening in a shell is objectionable, for there are blowholes enough adjacent to it to pass steam in large quantities. Some fittings of this kind were removed from the line entirely, while others were plugged or patched.

USE OF GUN IRON ADVOCATED

It would appear that some material better than the ordinary steel casting was

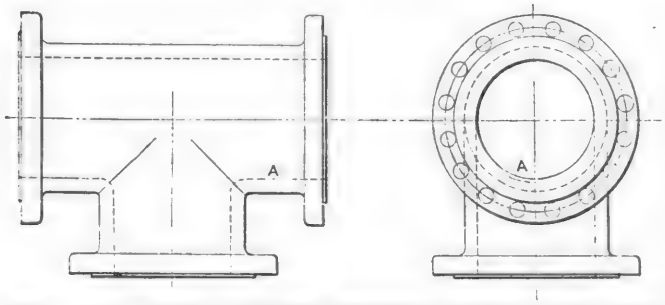


FIG. 1—10-IN. STEEL FITTING SHOWING DEFECT DEVELOPED AT A AFTER USE

desirable for high temperature work. Such a material is found in gun iron. Gun iron is nothing more than a high grade cast iron, which any first-class iron foundry can produce. In the days of the smooth bore cannon, a few foundries discovered that it was possible to produce an iron having a tensile strength of 30,000 lbs. or more. The government specified it for its guns and it was called gun iron. Probably a tensile strength of 30,000 lbs. is not needed in steam fitting, but iron of that quality is well adapted for 180 lbs. steam with 300° superheat.

The following analysis is of an iron that has been successful in every respect for four years under 300° superheat:

Silicon	1.72%
Sulphur	0.085%
Phosphorus	0.89%
Manganese	0.48%
Total carbon	2.45%
Combined carbon	0.17%

The latter sample is from an 8-in. valve and it is tight to-day, no repairs whatever having been made upon the valve during the four years, though the bonnet was taken off once to permit internal examination. The outer surface of the valve was covered with 85% magnesia insulation, 4½ in. thick. The inner surface appeared sound; a microscope revealed no cracks or other defects. The unfinished surfaces were struck several sharp blows with a ball peen hammer, a hand chisel was driven straight at the surface and some thick chips were cut off from the rough portion. If the metal had suffered to such an extent as cast iron is supposed to suffer, some of the defects would have made themselves manifest. After these treatments the valve was reassembled and has continued to perform its work properly.

Foundrymen are not afraid to attempt to produce this iron. No difficulty whatever was encountered in securing bids for valves made of the following mixture:

Silicon	1.40% to 1.60%
Phosphorus	0.20% to 0.40%
Sulphur	0.06% to 0.09%
Manganese	0.45% to 0.75%
Total carbon	3.00% to 3.25%

E. D. Dickenson, of Schenectady, on a recent trip abroad, asked a great many manufacturers whether they used steel for their superheated work, and received a negative reply in each instance. When the manufacturer was questioned in regard to his iron mixture he shrugged his shoulders and replied that he made his iron fit his needs, be it gas engine cylinder or steam pipe.

John Primrose, in Power and the Engineer, for June 3, 1909, states that he discussed the matter with English and German engineers. In one instance a well-known German engineer, who had used superheat for twenty-five years, was surprised that he had not learned of the effect of superheated steam upon cast iron. The engineer promised to investigate the matter in Germany, but he could find nothing to bear out the contention, and could find no one who believed that such a thing was possible.

It is not the author's intention to state that steel of good quality will not do for superheated work. Some manufacturers are putting out fittings of open hearth steel which are doubtless good; but any foundry can make gun iron if it will, and delay and uncertainty will be decreased by its use.

Domestic Engineering Sold

Domestic Engineering, of Chicago, has recently changed hands, having been purchased by the Canfield-Leach Publishing Co. John K. Allen, former editor, has been succeeded by Harry De Joannis. The business department is also reorganized.

The Progress of Compulsory Ventilation in the United States

The first law in which provision was made for the compulsory ventilation of school and other buildings was passed in 1894, so that the history of the progress of compulsory ventilation is confined to the intervening years between 1894 and the present date. The substantial progress made during those years, however, makes it possible to foresee the time when practically every state in the Union will have a compulsory ventilation law upon its statute books.

A review of what has been done, as well as the present propitious state of the movement, is contained in a valuable report* of a special committee that has been at work during the past year in gathering information on the subject.

The report opens by quoting the recommendations made by the society's committee on standards, to the effect that all such buildings as schools and asylums occupied almost entirely by children and youths under 15 years of age should have a minimum air supply for ventilation of 1,800 cu. ft. per hour per person, and that all buildings occupied by persons over 15 years of age should have a minimum air supply for ventilation of 2,000 cu. ft. per hour per person. For buildings lighted in part or wholly by gas, the recommendations provided for 3,000 cu. ft. of air per hour for each gas light.

Proceeding from this basis, the committee presents the following facts of what has been accomplished:

PUBLIC BUILDINGS SHOULD BE DEFINED

In the beginning the question arose as to the definition of a public building, for the committee's work was to look after legislation in the various states in the Union and to see that laws were enacted making it necessary to ventilate buildings so designated, but your committee has been unable to find anything in the proceedings of the society that sets forth what constitutes a public building, as school houses seem to be the only class of building that have been specifically named.

It has been suggested that the bills presented in future shall state clearly what buildings or classes of buildings are referred to, as they may include municipal buildings, court houses, jails, city and county hospitals, asylums, reformatories, houses of refuge, as well as state prisons, hospitals, asylums, institutions of learning, including normal schools, colleges and public and high schools. It is well also to call attention to the many private institutions, schools, hospitals, theaters, auditoriums and places of amusement and learning, none of which seems to come directly under the regulations, but should be ventilated under the law.

STATES IN WHICH LAWS ARE NOW IN FORCE

Laws regulating the ventilation of school house buildings are in effect in Massachusetts, New Jersey, Pennsylvania and Virginia, and bills have been prepared and will come up in 1911 for serious consideration in Ilinois, Indiana, Wisconsin, California, Colorado, Maryland, Michigan, North Dakota and West Virginia.

In Connecticut, Indiana, Minnesota, Utah and Vermont, ruling have been promulgated by the state boards of health in an attempt to regulate the ventilation of schools, but there is no law providing a fine for non-enforcement of the provision.

ALABAMA, ARIZONA AND ARKANSAS

In Alabama no ventilation law is in effect, and the secretary of state says there are no bills pending. The legislature meets again in 1911. We are also informed that the same conditions exist in Arizon and Arkansas.

CALIFORNIA

A bill based on the Massachusetts law has been drafted and will be presented at the next session of the California legislature meeting in 1911.

COLORADO

In 1906 House Bill 392 was introduced by one Mr. Smith in the Colorado state legislature and pushed by F. C. Goff, chief engineer of the board of education of the city of Denver, assisted by Howard H. Fielding, both members of the society, but was never made a law, although the originators of the bill hope for success in 1911.

CONNECTICUT

There is no law now in effect in Connecticut relating to the ventilation of public buildings, except that in Revision of the General Statute 1902, Paragraph 2,505, under the caption, "Duties of the State Board," it is stated that "said Board shall take cognizance of the interests of health and life among the people of this state; shall make sanitary investigations and inquire respecting the causes of disease." "Cause to be made by the Secretary or by a Committee of the Board of Inspection at such times as it may deem best and wherever directed by the Governor or the general assembly of all public hospitals, prisons, asylums or other public institutions in regard to the location, drainage, water supply, disposal of

*From the report of the Review Committee on Compulsory Legislation, John F. Hale, chairman, read at the annual meeting of The American Society of Heating and Ventilating Engineers, New York, Jan. 18-20, 1910.

excreta, heating and ventilation and other circumstances in any way affecting the health of the inmates." This, it will be noted, is little better than no law at all, for there is no specific statement as to what constitutes ventilation, as under this ruling the opening of a door or window would be sufficient to satisfy the inspector.

DELAWARE AND FLORIDA

The secretaries of state in both Delaware and Florida inform the committee that no law is in effect and, so far as they know, no bills have been presented for consideration.

GEORGIA

The state school commission in Georgia informs your committee that, although no law is in effect, most of the present installations in schools, theaters and public places have been equipped with blast fan apparatus for ventilating purposes.

IDAHO

Idaho has no law calling for the ventilation of public buildings, so we are informed by the secretary of state.

ILLINOIS

In Illinois the subject has been under consideration for some years, having first been suggested by the late Thomas J. Waters, at that time chief engineer of the Chicago board of education. It was not until 1907 that the matter was taken up definitely, at which time the Illinois chapter appointed a committee to prepare a bill and have it introduced, if possible. Unfortunately, this was brought before the legislature so late in the session that it was never acted upon. In 1909 the senatorial fight in the state of Illinois prevented the local committee from doing anything at that time, so that it is again a future prospect for 1911.

On January 1, 1910, a law went into effect in Illinois relating to the "health, safety and comfort of employees in factories." This law provides for a given quantity of fresh air for rooms containing various cubical contents, a full text of those sections relating to ventilation being a part of the report by the regular committee on compulsory legislation.

INDIANA

As stated in this year's report of the committee on compulsory legislation, the attempt was made in 1909 to have a law enacted in the Indiana state legislature and, in fact, it had reached the third reading in the House when it was killed, not because of any objection to the bill, but because the man who had introduced it had done something to displease certain legislators in power. The bill was known as Senate Bill 15, 1909.

The state board of health, under the leadership of Dr. Hurty, has done much to improve conditions in the Indiana state schools, and those who heard him speak at the Indianapolis meeting have no doubt as to the great importance of the movement to get better air in our school rooms. The state board of health has power to dictate the results to be had in schools, but, unfortunately, there is no law upon which to base their demand The bill which was defeated last year will be introduced again in 1911.

IOWA, KANSAS, KENTUCKY, LOUISIANA AND MAINE

Inquiries from the secretaries of state of Iowa, Kansas, Kentucky, Louisiana and Maine bring the same reply to the effect that no law has ever been enacted, nor are there any bills in preparation or up for consideration.

MARYLAND

Your committee is informed by Mr. Henry Adams, a member of this society from Maryland, that attempts have been made to have a law enacted in that state, but without success to date. A bill will be presented at the next meeting of the legislature, however.

MASSACHUSETTS

The Massachusetts law, which went into effect in 1894, was revised in 1901, and may be found in Chapter 104 of the revised laws of the state of Massachusetts, also in Chapter 106.

MICHIGAN

Several attempts have been made to have a law enacted in Michigan, but without success. A bill has recently been prepared by the Michigan member of the committee on compulsory legislation, and he has to report that it will be presented at the next meeting of the legislature in 1911. This bill calls for heating, lighting, sanitation and ventilation of a certain specified quality for any public building, school, church, theater, auditorium and assembly hall, the cost of which exceeds $4,000. The requirements are similar to other laws on the subject, including 70° F. temperature in zero weather, 15 sq. ft. of floor space and 200 cu. ft. of air per occupant and 30 cu. ft. of fresh air per minute per occupant.

MINNESOTA

Although there is no actual ventilation law in the state of Minnesota, the state board of health has revised "regulations relating to the construction of school buildings," which cover the principal features of the laws in other states, specifying 18 sq. ft. of floor space and 216 cu. ft. of air space, with 30 cu. ft. of fresh air per minute per occupant, etc.

MISSISSIPPI AND MISSOURI

In Mississippi there is no law or bill in prospect and, although the matter has been up for consideration in Missouri, the writer was unable to get a copy of the bill prepared, nor could it be learned what was in prospect.

MONTANA, NEVADA, NEW HAMPSHIRE AND NEBRASKA

In Montana, Nevada and New Hampshire there are no ventilation laws, while in Nebraska the ventilation feature was not made a part of the ventilation law recently enacted in that state.

NEW JERSEY

In 1902 a school law was enacted in the state of New Jersey and is known as the "Stokes" law, having been introduced by Governor Stokes at the time he was a member of the legislature. The committee from this society was instrumental in having the original bill introduced.

NEW MEXICO, OKLAHOMA, NORTH CAROLINA AND NORTH DAKOTA

In New Mexico, Oklahoma and North Carolina there are no ventilation laws, nor is one in prospect, but your committee is pleased to report that a member of the North Dakota state legislature has promised to try and have a bill passed next year, and a bill is in preparation based upon other laws relating to the subject.

OHIO

In Ohio there is no ventilation law, but certain regulations are set forth by the department of inspection of works, shops, factories and public buildings, stating that 65° F. in zero weather is the temperature required in schools and that either direct or a furnace system is to be used for heating, although this is not carried out in actual installations, as a combination of direct and blast is more frequently used in the larger cities of Ohio. The ventilation requirements in the code are very incomplete, specifying 200 cu. ft. of space for each pupil, but making no mention of the supplying of any given quantity of fresh air.

OREGON, RHODE ISLAND, SOUTH DAKOTA, SOUTH CAROLINA, TENNESSEE, TEXAS, WASHINGTON AND WYOMING

Inquiry from members of this society and several state officials brings out the facts that no ventilation laws exist in Oregon, Rhode Island, South Dakota, South Carolina, Tennessee, Texas, Washington or Wyoming.

PENNSYLVANIA

A law for Pennsylvania was signed April 22, 1905, by Governor Pennypacker, of Pennsylvania, this being the direct result of the committee appointed by this society.

UTAH

A law was enacted by the Utah state legislature at the last session calling for 15 sq. ft. of floor space, 200 cu. ft. of air per pupil and fresh air to the extent of 30 cu. ft. per minute per pupil.

VIRGINIA

On March 11, 1909, the Virginia state legislature enacted a law which is "an act for the purpose of regulating the construction of public school buildings in order that the health, sight and comfort of all pupils may be properly protected." In this, the state board of inspectors for public buildings is given power to pass upon the plans for the erection of any school building or room in addition thereto, the provision calling for the usual 15 sq. ft. of floor space and 200 cu. ft. of air per pupil, also for 30 cu. ft. of fresh air per minute per pupil.

WEST VIRGINIA

Your commitee is informed by Mr. O. L. Badger, member of this society, that in 1899 or 1900 he assisted in drawing up a bill which a Mr. George, of Brook County, West Virgina, introduced in that legislature, but, unfortunately, the bill died in the committee room. It would seem to the writer that this bill should be revived and, as Mr. Badger offers to follow the matter up, the matter might be referred to him under the control of the committee on compulsory legislation.

WISCONSIN

At the last session of the Wisconsin state legislature Senator Burke introduced Senate Bill 139-S, 1909, relating to "ventilation, heating, sanitation and protection from fire in public buildings," but the senate committee having the matter in charge failed to present the bill and, as a result, it will have to be introduced again next year.

From the above it will be seen that of the 49 states and territories in the Union, but 7 or 14⅓% have ventilation laws, and only 3 or 6% have bills pending, and 11 or 22½% have bills being worked on. This leaves 57% of the states in the Union with no laws or prospects.

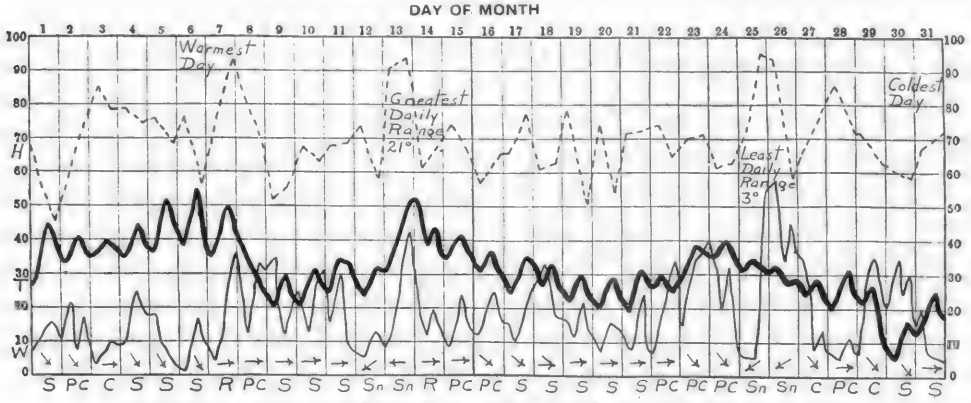
Electricity From Peat

Deputy Consul John S. Armstrong, Jr., of Cork, has transmitted an abstract of an article regarding the value of the unutilized peat deposits of Ireland for the generation of electrical energy, which appeared in the Irish Year Book for 1909, and which reads:

"The calorific value of 10 tons of peat, freshly dug and untreated, is assumed to equal that of 1 ton of ordinary coal. There are in Ireland 2,800,000 acres of unutilized bog land with a depth varying from 16 to 30 ft. There are 18,231 tons of peat to 1 acre of bog, and this would be equivalent to 1,823 tons of coal. Accordingly, the total calorific value of the bog lands of Ireland is estimated as being approximately equal to that of 5,104,000,000 tons of coal. Moreover, at least half of this quantity could be conservatively counted on as available ultimately for steam raising purposes. Peat fuel equal to coal could be produced in selected localities in Ireland at $1.75 per ton."

The Weather for December, 1909

	New York	Boston	Pitts-burg	Chicago	St. Louis
Highest temperature, degrees F	54	56	65	55	62
Date of highest temperature	6	6	5	5	5
Lowest temperature, degrees F	6	4	−1	−7	−1
Date of lowest temperature	30	31	30	30	29
Greatest daily range, degrees F	21	20	25	36	38
Date of greatest daily range	13	6	5	5	15
Least daily range, degrees F	3	4	4	5	4
Date of least daily range	25	2	14	26	14
Mean temperature for month, deg. F	31	31	27	22	26
Normal mean temp. for this month	34.1	32	34	28.8	36
Total rainfall, inches	5	3.19	2.30	4.18	1.89
Total snowfall, inches	11.4	12.3	8.5	19.1	9.1
Normal precipitation, this month	3.43	3.35	2.77	2.11	2.18
Total wind movement, miles	11964	9403	9009	12278	8755
Average hourly wind velocity, miles	16.1	12.6	12.1	16	11.8
Prevailing direction of wind	West	West	West	West	West
Number of clear days	14	17	4	7	4
Number of partly cloudy days	8	7	8	9	3
Number of cloudy days	9	7	19	16	24
Number of days on which rain fell	6	6	14	18	13
Number of days on which snow fell	5	4	11	15	9
Snow on ground at end of month, ins	8.4	9.2	5.4	9.2	0.4


DAY OF MONTH
Warmest Day
Greatest Daily Range 21°
Coldest Day
Least Daily Range 3°
H
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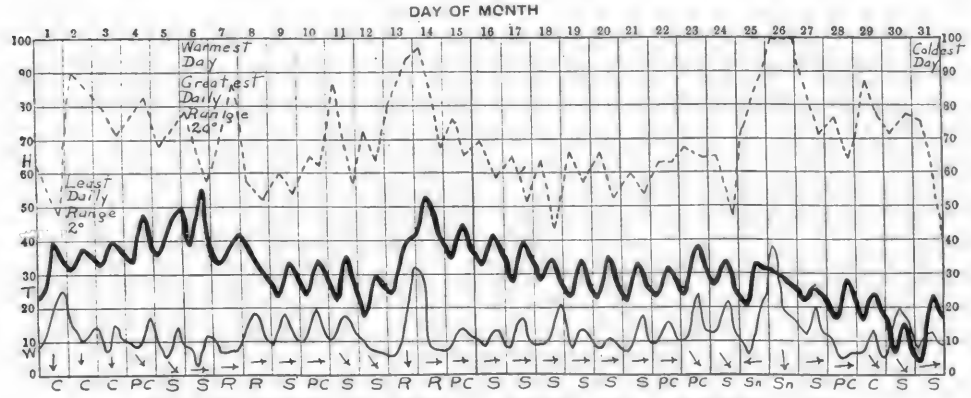
RECORD OF THE WEATHER IN NEW YORK FOR DECEMBER, 1909


DAY OF MONTH
Warmest Day
Greatest Daily Range 20°
Coldest Day
Least Daily Range 2°
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T
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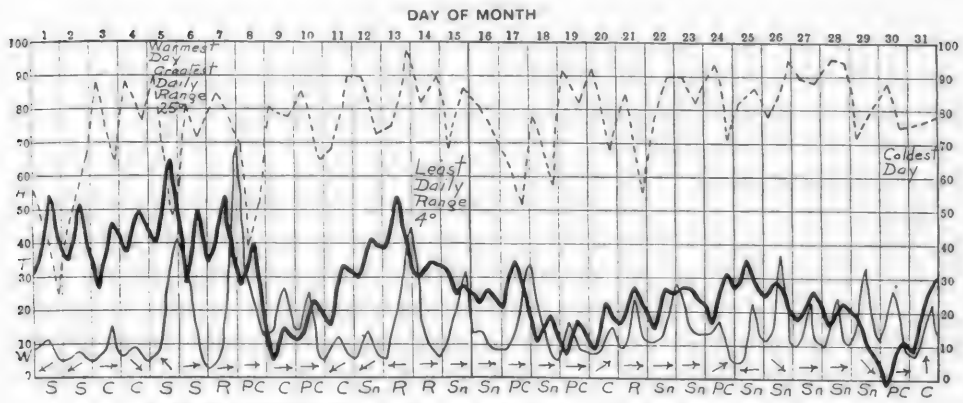
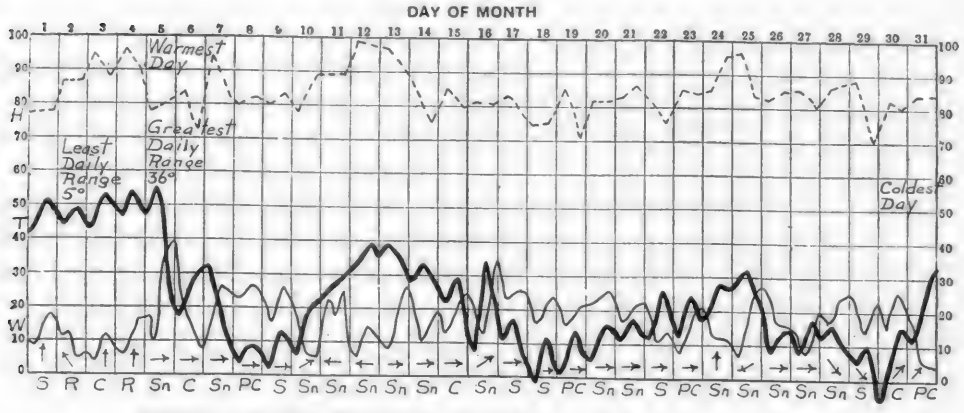
RECORD OF THE WEATHER IN BOSTON FOR DECEMBER, 1909

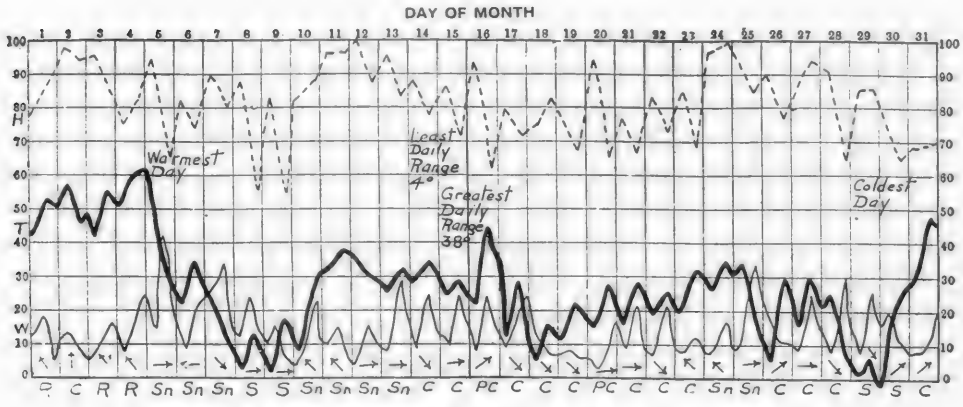
Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE by the United States Weather Bureau.
Heavy lines indicate temperature in degrees F.
Light lines indicate wind in miles per hour.
Broken lines indicate relative humidity in percentage.
S—clear, C—partly cloudy, C—cloudy, R—rain, Sn—snow.
Arrows fly with prevailing direction of wind.



RECORD OF THE WEATHER IN PITTSBURG FOR DECEMBER, 1909



RECORD OF THE WEATHER IN CHICAGO FOR DECEMBER, 1909



RECORD OF THE WEATHER IN ST. LOUIS FOR DECEMBER, 1909

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE by the United States Weather Bureau.
Heavy lines indicate temperature in degrees F.
Light lines indicate wind in miles per hour.
Broken lines indicate relative humidity in percentage.
S—clear, P C— partly cloudy, C—cloudy, R—rain, Sn—snow.
Arrows fly with prevailing direction of wind.

Current Heating and Ventilating Literature

Under this heading is published each month an index of the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the articles mentioned may be obtained from THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

CAR VENTILATION.

Two Recent Developments in Car Ventilation. Describes a new system being tried on street cars in Chicago, and gives particulars of an improvement for ventilating sleeping-car berths and dining-car refrigerators. Ills. 1000 w. Eng News—Dec. 3, 1909. 20c.

CENTRAL PLANTS

A New Congressional Heating, Lighting and Power Plant at Washington. George H. Draper. Brief illustrated description of the nearly completed central plant built to serve a group of government buildings. 2500 w. Elec Rev, N Y—Dec. 11, 1909. 20c.

ELECTRIC HEATING

Electric Heaters. H. M. Phillips. Considers various heating devices, such as gas heaters, steam or hot water and especially the advantages of electric heating appliances. 4500 w. Cassier's Mag—Dec., 1909. 40c.

ECONOMIZER PRACTICE

Fuel Economizer Practice. William Kent. Shows results theoretically attainable; gives method of calculating savings; discusses amount of heating surface required; gives results of tests of a large economizer. 1500 w. Ind Eng—Nov. 14, 1909. 20c.

FANS

Test of a Waddle Fan. G. L. Kerr. Describes the method of conducting the test and of determining the losses due to leakage of air at shaft head, etc. 2500 w. Mines & Min—Dec. 1909. 40c.

HOT-WATER HEATING

Comparison of Forced-Circulation Hot-Water, and Vacuum Steam Central Heating Plants. Joseph T. Maguire. Aims to show the superiority of the large hot-water plant. 2200 w. Eng News—Dec. 23, 1909. 20c.

STEAM HEATING

A High-Pressure Feeder for a Low-Pressure Heating System. William Kent. Describes a method planned to save fuel in a large New England factory. 1200 w. Ind Eng—Dec. 15, 1909. 20c.

Heating Plant for a Railway Storehouse. J. Irving Brewer. Describes the storehouse and the steam heating arrangements. 2000 w. Eng Rec—Dec. 18, 1909. 20c.

VACUUM PUMPS

Rotative Dry Vacuum Pumps. Fred. H. Moody. Describes this class of pump and its uses, operation, etc. Ills. 2000 w. Ap Sci—Dec., 1909. 40c.

Heating Engineers' Annual Dinner

(*Continued from page* 17)

stands to-day in an influential position and I believe its recommendations sent out over the country will have great weight. One of the society's most important duties is the presentation before the country of the great need of proper ventilation. The beginning of the crusade for compulsory legislation on this matter will need the combined effort of every member, and every member should be versed in the requirements.

"I consider our committee on standards the most important of any that is appointed. We do not need to establish definite standards but the recommendations of this committee should have all the effect of standards."

Past President James Mackay spoke on "A Brief Review of Our Work." "We of to-day," he said, "enjoy the distinction of living in an age of wonderful improvement. We are the heirs of all the ages. It is said that from 200 to 300 years are needed to produce a profound scholar or philosopher, but we have more to do than most agencies with what concerns prolonging life and alleviating suffering. There is a national movement on foot for the eradication of tuberculosis. This white scourge overspreads our country. New York City alone has expended $800,000 in this cause, in addition to that expended by the department of health. Preventable diseases are most acute during the heating season. The outdoor schools for children show how little progress we have made in making the air in buildings pure and healthful.

"This society has taken an important step in this direction through the appointment of a publicity committee whose duty it is to promote good living. In this work we are making an indelible record."

"The Relation of the Society to the Public" was discussed by S. R. Lewis, the first vice-president-elect. "Our places when we retire," he said, "must be filled from the ranks of the public. I look forward to the time when we shall be asked to furnish data on heating and ventilating engineering that will be generally recognized as authoritative. We are really the doctors of ventilation and we are occasionally

called in on some pretty sick jobs. A body of picked men has been selected for the Publicity Committee which is to see that schools are ventilated in accordance with laws now in force and to secure the passage of suitable laws in states which have as yet no regulations. But the ventilation of homes is spasmodic and intermittent. We coop ourselves up in bottles. This is a matter that may well engage the attention of the committee."

H. W. Whitten, speaking for "The New Members," said the aim of members should be not what can be gotten out of the society, but what can be given to it. New members must join the ranks of the society with the idea of being contributors. Mr. Whitten also urged better support on the part of the membership to the requests of committees for information and data. In conclusion, he urged the new members to push the society and its aims and never fear about the advancement of their own personal interests.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Illinois Chapter's Effective Publicity Campaign for Better Ventilation

Due largely to the agitation of the subject by the Illinois Chapter of The American Society of Heating and Ventilating Engineers, Chicago, is undergoing at the present time a wave of reform as regards the ventilation of buildings used by the public that is likely to have far-reaching results. At the January meeting of the Illinois Chapter the speakers included Dr. W. A. Evans, of the Chicago Health Department; Dr. G. H. Hurty, State Commissioner for the Indiana Board of Health; Dr. William Winslow, of the Massachusetts Institute of Technology; Charles B. Ball, Chief Sanitary Inspector of Chicago, and Dr. Tonney, of the Chicago health department.

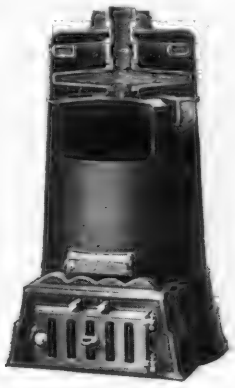
One of the most interesting features of the meeting was the proposal by Dr. Evans of a conference or commission to consist of from three to six sanitary experts and a like number of ventilating engineers to meet and devise methods of improving the sanitary conditions of public buildings. This suggestion was heartily endorsed by Dr. Hurty. On another page of this issue will be found some of the movements that have since been set on foot in Chicago with this object in view.

American District Steam Co., Lockport, N. Y., is sending out a handsome calendar containing a well-executed lithograph of the Cascade Falls, in Yosemite Valley.

NEW DEVICES

A New Tank Heater for Apartment House Work

The Sunray round series tank heater has been brought out by The J. L. Mott Iron Works, New York, to meet the demand for a more efficient tank heater for apartment house work. It is claimed for this heater that it is solid and substantial in construction, simple in operation, and will run at its full capacity for eight hours on one charge of fuel.



NEW SUNRAY TANK HEATER

It is fitted with a cold air check on the side of the base, so that an automatic regulator may be used without being constantly interfered with by the attendant in firing or cleaning.

The heater requires but little attention and skill. It will stand a pressure of 75 lbs., and is tested to 150 lbs. pressure. It is shipped in two sections, and can easily be set up in a very few minutes. A descriptive circular of this series Sunray heater is being distributed to the trade upon request.

Improved Sargent Automatic Gas Calorimeter and accessories, for determining the calorific value, dust, tar, moisture and solid matter in commercial and inflammable gases, is described in a new catalogue published by the makers, the Sargent Steam Meter Co., 271-285 Madison street, Chicago. The calorimeter consists of a wet test meter in which the gas consumed is accurately measured. From this meter the gas flows to a governor which maintains a uniform pressure of gas at the burner. In the calorimeter proper the accurately measured gas is burned and its calorific value is manifested in the rise of temperature

of measured quantities of water flowing through. From the calorimeter proper the heated water for each unit of gas burned is automatically discharged into one of the pails in which it is weighed on decimal scales. The pounds of water, times its rise in temperature, times the quantity of gas in cubic feet consumed gives the B. T. U. direct. A governor between the meter and the calorimeter is designed to maintain a non-pulsating flame at the burner.

Fig. 2 is a sectional elevation of the calorimeter in which the inlet water, having a constant head at the wier A, the temperature of which is taken at B, passes down the tube C, and enters the calorimeter at D. Here the water is spread around the bottom of the instrument by the baffle plates E and F, and then flows upward, as indicated by the arrows around the tubes G, through which the products of combustion pass. The partially heated water on leaving the tubes spreads out over the dome sheet H, where it is heated by the hottest gases and then passes to the wier K, through the baffle plates I and around the thermometer J, where the outlet temperature is taken. From this wier K the water is discharged into the automatic tipping bucket, which delivers the heated water alternately to the copper pails.

The combustion of gas takes place in the central flue at L, the products of combustion passing upward to the dome

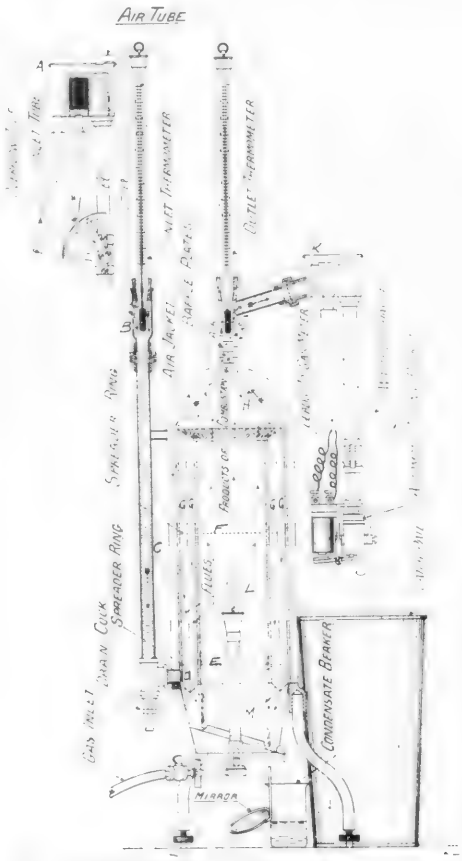


FIG. 2 SECTIONAL ELEVATION OF AUTOMATIC GAS CALORIMETER

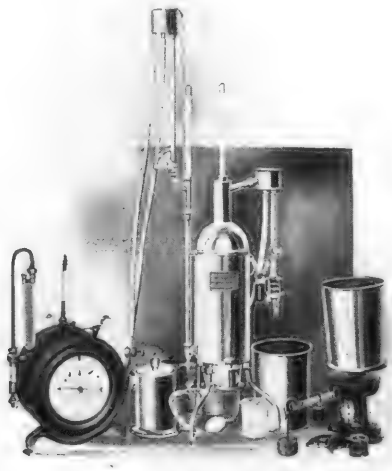


FIG. 1—NEW AUTOMATIC GAS CALORIMETER

sheet and then down through the flues following the arrows in a contrary direction to that taken by the water. The gases are discharged at M where the temperature is maintained the same as that of the surrounding air by the damper N and the quantity of water flowing through.

Special features of the apparatus are described at length in the catalogue, as well as the various uses to which it may be put. Size 3½ x 6¼ in. Pp. 36.

Typical Installation of the Kinealy Air Purifier and Humidifier

The accompanying illustrations show a typical installation of a Kinealy air purifier and humidifier in connection with a recently completed plant in the new Mechanics-American Bank building in St. Louis, Mo.

This particular apparatus has a capacity to purify 34,000 cu. ft. of air per minute. The air is taken from the outside through a special opening for a series of

AUTOMATIC SPRAY HEAD OF KINEALY AIR PURIFIER

tempering coils and into the washer chamber.

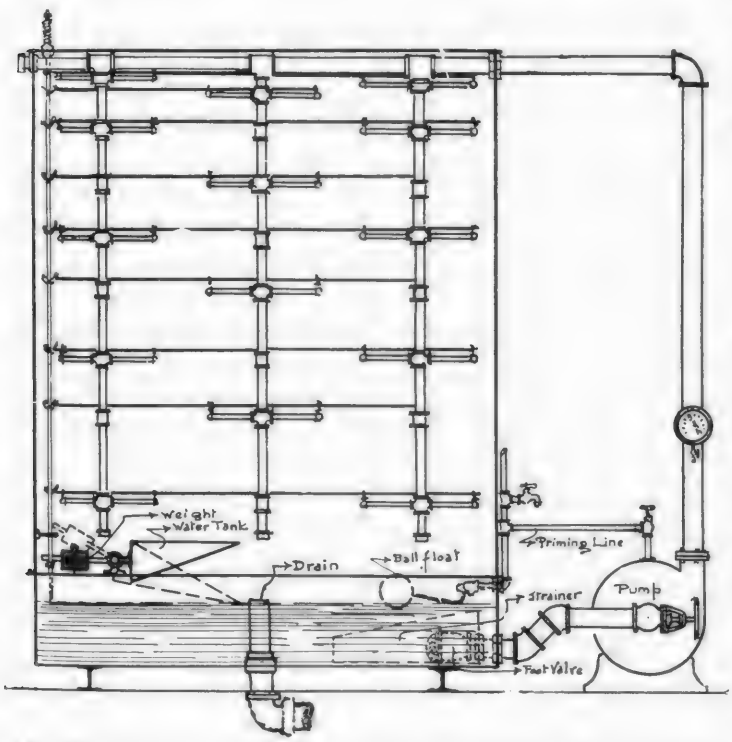
The air is then saturated, having a humidity of about 96% by coming in contact with the complete combination mist and rain effect of water produced by the Kinealy automatic sprayheads (which is considered the most important feature of an air purifier).

All dust, dirt and gases that are soluble in water are instantly removed by coming in contact with this washer. Some of the finer particles of dirt are carried with the water into the eliminators and deposited on the eliminator plates and washed to the sump tank.

VIEW OF INSTALLATION, SHOWING ELIMINATOR SIDE OF AIR PURIFIER

The control of humidity of the air is accomplished very easily with the Kinealy automatic sprayhead on account of the form of spray and complete saturation of the air. By this simple method any desired percentage of humidity can be maintained by the use of steam for increasing and refrigeration for decreasing the humidity. Very good results have been obtained in some of the Kinealy air purifiers without the use of refrigeration, but the manufacturers do not claim they can do anything unnatural with the air in the humidity control except by the aid of refrigeration.

The Kinealy air purifier and humidifier has been on the market for about two years, and in that time the manufacturers, the Kauffman Heating & Engineering Co., of St. Louis, Mo., announce that they have sold 104 of these purifiers, purifying a total of 3,143,200 cu. ft. of air per minute.



ARRANGEMENT OF CLEANING DEVICE IN KINEALY AIR PURIFIER

Fowler & Wolfe Mfg. Co., Philadelphia, the well-known manufacturers of wall radiators, are presenting a neat leather-bound memorandum pad to its many friends in the trade. The company takes the opportunity to announce that immediately after accurate costs can be determined, new quotation sheets will be mailed to its patrons.

CORRESPONDENCE

The Relative Efficiency of Exhaust and Live Steam in Heating

Editor HEATING AND VENTILATING MAGAZINE:

In regard to the matter of heat transmission from live steam, wire-drawn and superheated by passing through a reducing valve, as compared with the transmission from saturated exhaust steam, we have recently run across some interesting figures in a paper read before the British Institute of Civil Engineers, December 22, 1908, by F. H. Corson, showing the results of tests made by him at the Blackburn Electrical Works. These tests covered a period of two years, and finally a week's test of the entire plant was carried out as accurately as possible. Among other losses of heat were those due to radiation from steam pipes. We quote the following:

"The tests showed that the pipe loss was 473 B. T. U. per sq. ft. per hour. The test was made at 380° saturation temperature and does not represent the truth, for the steam flowing in the pipes was at 450° and 650°. It was found that with a flow of 16,000 lbs. per hour at 580° to 600°, the temperature fell 15° in a 72-ft. length of 14-in. pipe. The same weight through a 10-in. pipe lost less in temperature.

"Thus, while saturated steam lost 473 B. T. U., as above, superheated steam lost only 376 heat units on a basis of specific heat equaling 0.48, and only 427 units on a basis of specific heat equaling 0.545. Both the latter figures are below the saturation loss, as we should expect them to be, in spite of the higher temperature, but all such figures are doubtful. Still men who advocate superheat always affirm that superheating does reduce pipe losses."

Now, if we assume a boiler room temperature during these tests of 90°, the difference of temperature between the air and 380° steam is 290°. Dividing 473 by this gives 1.63 B. T. U. per sq. ft. per hour per degree difference of temperature as the coefficient for loss of heat from pipes filled with saturated steam. Taking 590° as the average temperature of the pipes filled with superheated steam, the difference is 500°, which divided into 427 gives 0.854 B. T. U. as the loss per sq. ft. per hour per degree difference of temperature from superheated steam.

To apply these figures to steam heating, consider a radiator fed from a steam main carrying saturated steam at 20 lbs. gauge through a reducing valve which lets the pressure down to atmospheric. This will result in 35.50 of superheat, so that the temperature of the steam entering the radiators will be 247.5°. If the temperature of the room be taken as 65°, the temperature difference will be 182.5°. So if we take 0.854 as the heat transmission per sq. ft per hour per degree difference of temperature with superheated steam, the total heat transmission from the radiator containing the latter will be 155.9 B. T. U. per hour per sq. ft. of surface; on the other hand, the radiator containing saturated exhaust steam at atmospheric pressure will have a temperature head of 147° F. above air at 65°, which multiplied by 1.63 will give transmission per sq. ft. per hour of 239.6 B. T. U., or roughly about 54 per cent more than in the case of superheated steam produced by wire-drawing through a reducing valve.

We cannot, of course, claim any great accuracy for the above figures, but they show that there is something in this connection worth investigating.

Philadelphia Jan. 31, 1910.

HARRISON SAFETY BOILER WORKS.
Geo. H. Gibson.

Superiority of Exhaust Steam Over Live Steam for Heating

Editor HEATING AND VENTILATING MAGAZINE:

The statements in the conclusion of Mr. Mueller's article in your November issue, concerning the superiority of exhaust steam over live steam for heating purposes are so extraordinary that he should be asked for a reasonable theory to explain them. He seems to hold that it would pay to run an engine, driving an electric generator and wasting the electric current, just to obtain exhaust steam for heating purposes, rather than to do the heating by live steam taken from the boiler. If so, why?

A fairly good high-speed engine may convert into work about 8% of the heat in the steam supplied to it, rejecting 92% in the exhaust steam and in the water of condensation. If a heating plant utilizes all this 92%, why will it not be at least as economical to get this amount of heat directly from the boiler in the shape of live steam while the engine is shut down as to run the engine, wasting the work it does, for the purpose of making exhaust steam? Will Mr. Mueller give the solution of the question in heat units, making a heat balance to show how the heat furnished by the boiler is disposed of in both the case of live steam and exhaust steam heating? He might also give us the heat units of the case in which more coal is used in an electric plant furnishing steam for heating when the load is light than when it is heavy.

WM. KENT.

TRADE AND MISCELLANEOUS NOTES

Coming Events

March 14, 15 and 16, 1910.—Annual convention of the National Association of Jobbers of Wrought Pipe and Fittings, Pittsburg, Pa. Headquarters at the Fort Pitt Hotel.

Deaths

Clarence C. Mulford, manager of the boiler salesrooms of Pierce, Butler & Pierce Mfg. Co. in New York, died January 1 at his home in Brooklyn, N. Y., of a complication of diseases. Mr. Mulford was 52 years old and had been in the heating business during his entire business career. He was a member of The American Society of Heating and Ventilating Engineers.

Miscellaneous Notes

Chicago.—In an address by William E. Watt, principal of the Graham School, delivered before the Social Service Club last month, the speaker said: "The greatest subject in education to-day is ventilation. We have in Chicago the best system of ventilation ever devised, but it has two defects, which are vital. One is that the air goes through the rooms but does not get about in them. The other defect is that absolutely no humidity is supplied to the heated air in many of our best schools." Mr. Watt advocated, among other things, fresh air classrooms in which the windows should be kept open and the students dressed in out-door clothing.

Chicago.—A sub-committee of the city council's building committee held a formal discussion in January to devise methods of providing better ventilation for theatres, department stores, office buildings, churches and tenements in Chicago. Among the speakers were Health Commissioner W. A. Evans, State Factory Inspector Davies, former Health Commissioner Reynolds, Prof. Winslow of Columbia University, and E. A. Renwick of Holabird & Roche, architects. A committee of five aldermen was subsequently appointed to investigate the sanitary conditions, with special reference to ventilation and nat-

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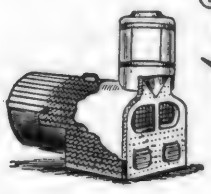

ROBERT A. KEASBEY CO.

HEAT AND COLD INSULATING MATERIALS

HEADQUARTERS FOR

85% MAGNESIA, ASBESTOS AND BRINE PIPE COVERINGS, ASBESTOS PRODUCTS, ETC.

ESTIMATES FURNISHED AND CONTRACTS EXECUTED.

100 NORTH MOORE ST. NEW YORK CITY.

ural light, in the downtown offices, department stores, factories and other buildings. One of the special objects of the investigation will be the overhead balconies used in the department stores and factories primarily as space savers. It is thought probable that the committee will suggest the appointment of a city officer to be known as the city ventilating engineer.

Cleveland, O.—A proposition to issue bonds for building a heating plant that will heat the city hall and court house will be voted upon shortly by the people of Cleveland.

Pocohontas, Ia.—A vote was taken, January 14, on the proposition of incurring an indebtedness of $14,000 for the construction of a lighting and heating plant.

Harrisburg, Pa.—The counsel for the proposed Consumers' Electric Heating, Light & Power Co., of Harrisburg, has applied to the legislature for a charter.

Oconto, Wis.—24 of the 79 rural schools in Oconto County are reported as equipped with adequate heating and ventilating systems, together with other equipment, and are entitled to special state aid, as provided for in a state law.

Sioux City, Ia.—The new municipal heating plant will be ready for use by April. The plant will supply 16,000 sq. ft. of radiation.

Chicago.—According to an amendment recently proposed to the traction ordinance, the minimum temperature for elevated and suburban trains heated by steam is placed at 50° F., while the temperature must not exceed 75°. The proposed amendment also calls for the proper ventilation of all surface, elevated and suburban trains. Enforcement of the proposed provision is to be undertaken by inspectors from the health department.

Chicago.—Prosecution of traction companies for violations of the ordinance requiring the proper heating and ventilation of street cars is to be undertaken at the direction of Traction Expert Milton B. Hereley. In a recent examination of 150 cars, a number were found to have a temperature below that prescribed, namely, a minimum of 50° F.

Central Station Engineering Co., Evansville, Ind., is seeking a franchise for a central heat, light and power plant to be established at Evansville at a cost of about $1,000,000.

Modern Science Club, Brooklyn, N. Y., announces among the recent lectures delivered before its members, one by William W. Macon, on "Some Heating and Cooling Calculations," February 8, and one by A. R. Maujer on "Chimneys, Their Design and Construction," February 15. On January 25, James A. Donnelly addressed the club on "Some Special Features in Connection with Recent Heating Installations."

Harry S. Martin, for many years general manager of sales for the United States Radiator Co., Dunkirk, N. Y., has received an appointment in the sales department of Hart & Crouse Co., Utica, N. Y.

Industrial Engineering, of Pittsburg, Pa., and The Engineering Digest, of New York, have been consolidated, the January issue of these two journals being published under the title of "In-

"THE POTTER" MESH SEPARATOR
OR BOILER DRY-PIPE
DRY STEAM—SAFETY—ECONOMY
POTTER SEPARATOR CO., Newburgh, N.Y. N.Y. OFFICE: 39 Cortlandt St.

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NEVER SETS
It makes connecting and disconnecting easy—not a cement but a lubricating compound. It makes tight joints, though. Write for free sample.
JOSEPH DIXON CRUCIBLE COMPANY
JERSEY CITY, N. J.

dustrial Engineering and The Engineering Digest."

F. A. Hall, for the past 12 years manager of the chain block and hoist department of the Yale & Towne Co., 9-13 Murray street, New York, has resigned his position to accept election as vice-president and treasurer of the Cameron Engineering Co., Brooklyn, N. Y., which will make a specialty of trolleys and appliances for overhead handling of materials, including the Yale & Towne blocks and hoists. Mr. Hall's successor is R. T. Hodgkins, who for several years has been his chief assistant.

New York—A strike of steam fitters involving nearly all of the steam and hot water fitting contractors in Manhattan and Brooklyn has resulted in at last placing the business of the New York contractors on an open-shop basis. The following resolution was unanimously adopted, January 25, by the Master Steam and Hot Water Fitters' Association of New York City: "Resolved, that our members, and those firms and corporations who are acting with us, are hereby authorized to offer steady employment to mechanics who have proved themselves competent, and in the event of a settlement of the existing strike this association shall provide for the continued employment of mechanics by their employers who consider them competent."

Manufacturers' Notes

Hart & Crouse Co., Utica, N. Y., manufacturer of the Royal line of boilers, has moved its New York office from the Terminal Building to Kent avenue and Rodney street, Brooklyn.

National Tube Co., Pittsburg, Pa., has appropriated $111,000 for improving its plant at Kewanee, Ill. This brings the total appropriation for improvements at the Kewanee plant to $325,000.

A. Wyckoff & Son Co., Elmira, N. Y., is arranging to build a plant at a point in the South for the manufacture of steel banded wooden pipe.

Shirley Radiator & Foundry Co., Indianapolis, Ind., will move its offices in the spring to Shirley, where its plant is located.

Crane Co., Chicago, in addition to increasing its plant in Chicago, as announced in last month's issue, will build an 8-story branch building at 7-9 Collins street, Atlanta, Ga., on a plot 160 x 105 ft. The company is also planning to build a 5-story building at Sioux City, Ia.

Milwaukee, Wis.—A $75,000 fire on the night of January 8 gutted the quarters of Downey & Kruse, heating contractors, at 137 Sycamore street, the damage being $30,000 and the quarters of the Bayley Heating Co., 131 Sycamore street, $30,000 damage.

THE
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OF THE STATES OF
MASSACHUSETTS NEW JERSEY
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INCLUDING NEW YORK AND ILLINOIS
STATE FACTORY VENTILATION LAWS
Comprising all the statutes now in force in this country regulating the ventilation of school and other public buildings
BOUND IN VEST POCKET SIZE
Price, 15 Cents net, or 17 Cents, Postpaid
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Thatcher Furnace Co., New York, announces the appointment as general manager of sales of Harvey J. Fuller. Edward E. Barto has been placed in charge of the company's interests in Pennsylvania and New Jersey.

Harrison Engineering Co., New York, has been given the order for an air-tube heater system to be installed for heating and ventilating the Col. Spaulding Building, a 12-story office block in Portland, Ore. Five units will be used, each consisting of heater, fan and electric motor.

New Firms and Business Changes

Carnenter & Faile, 68 William street, New York, is a new engineering firm composed of Prof. R. C. Carpenter, the well-known heating and ventilating engineer, and E. H. Faile, of New York, to engage in the design of heating and ventilating systems, power plants, sanitary equipment, elevators and lighting systems. Mr. Faile is a graduate of Sibley College, Cornell University, on whose faculty Prof. Carpenter has long served as head of the department of experimental engineering. Some of the important work in which Mr. Faile has been engaged was the supervision for the owner of the construction of the City Investing Building in New York.

Grier-Gillham Co., Reliance Building, Kansas City, Mo., is a new heating and ventilating engineering firm, composed of T. J. Grier and Walter E. Gillham, both of whom have had much experience in this line of work.

Norman A. Hill Engineering Co., 1503 Sansom street, Philadelphia, is the new corporate name of the Malcolm W. Hill Co., of the same address, contracting engineers for heating, electrical work and power plants. Mr. Norman A. Hill, the president, announces that he has bought the entire interest in this Pennsylvania Company of his brother, Malcolm W. Hill, of Baltimore, Md., who is president of the Malcolm W. Hill Co., of New York.

Buffalo Heating Co., Buffalo, N. Y., contractor for steam and hot water fitting and power plants, has opened an office at 267 Broadway, Buffalo. The principals of the firm are L. Schelley and F. C. Gates.

New Incorporations

Chicago Central Mfg. Co., Chicago, capital $20,000, to manufacture valves and other appliances. Incorporators: John S. Hummer, Charles A. McDonald and J. P. Dunne.

Rich-Falconer Co., Omaha, Neb., capital $10,000, to conduct a heating and plumbing contracting business. Incorporators: Thomas Rich, Thomas Falconer and D. W. Merrow.

"CROOKED WORK MADE EASY"

Method of Making Angle with Slotted Angle Flange.

Slotted Angle Flanges will make any angle up to and including ten degrees. Any angle up to the maximum can be made simply by shifting the two flanges to the desired position. The slot in the bolt circle gives bolt hole for any position, and after adjusting to the desired angle fitting is made up in usual manner.

AMERICAN DISTRICT STEAM CO.

Lockport, N. Y. N. Tonawanda, N. Y. Chicago

H. W. JOHNS-MANVILLE CO.

ASBESTOS AND MAGNESIA COVERINGS ROOFINGS, PACKINGS, FIRE-PROOF AND COLD STORAGE INSTALLATION, ELECTRICAL AND PLUMBERS' SUPPLIES, ETC.

SEND FOR CATALOG - OFFICE AND WAREHOUSE IN EVERY LARGE CITY.

Pickerel-Schneble Co., Dayton, O., capital $5,000, to engage in the heating and plumbing business. Incorporators: David L. Pickerel, David Schneble and A. W. Schulman.

Sergeant Heating Plant Co., Tacoma, Wash., capital $10,000, to manufacture heating appliances. Incorporators: W. P. and E. L. Sergeant and B. S. Douglas.

Bridgeport Plumbing Supply Co., Bridgeport, Conn., capital $20,000. Incorporators: S. Ketcham, So. Norwalk; F. A. Hogenauer, R. A. McClenahan and A. J. Hogenauer.

John R. Sheehan Plumbing Co., Schenectady, N. Y. capital $10,000, to take over the heating and plumbing business conducted by John R. Sheehan.

Connolly-Warde Mfg. & Supply Co., Lake Waccabus, Lewisboro, N. Y., capital $50,000, to conduct a jobbing business in heating and plumbing supplies. Incorporators: J. S. Warde, W. Wheeler, of West New Brighton, and V. E. Arnold, of New York

Michigan Pipe Covering Co., Grand Rapids, Mich., capital $10,000, to manufacture pipe covering, etc. Incorporators: T. H. Wilson, A. L. Evans and Grace M. Wilson.

Gibson-Schlemmer Co., Cincinnati, O., capital $25,000, to engage in a heating and plumbing contracting business. Incorporators: Clifford P. Schlemmer, Oliver Schlemmer and James O. Gibson.

Republic Engineering & Construction Co., Buffalo, N. Y., capital $25,000, as designing and constructing engineers for heating, ventilating and power plants. Incorporators: F. G. and W. T. Lane, both of Buffalo and E. J. Proulx, of Philadelphia.

Enterprise Plumbing Supply Co., Chicago, capital $35,000, to conduct a jobbing business in heating and plumbing supplies. Incorporators: John L. Fruin, David Jacobson and R. T. Brady.

Watson-Penfield Corporation, Hartford, Conn., capital $20,000, to manufacture heating and plumbing specialties. Incorporators: Henry J. Watson, president and treasurer; R. W. Penfield, secretary, and Nicholas K. Beck, of New Bedford.

Arthur McKinley Plumbing Co., Kansas City, Mo., capital $10,000. Incorporators: S., M. E. and Arthur McKinley.

Gibby Heating Co., Buffalo, N. Y., capital $40,000, to conduct a general contracting business steam and hot water fitting. Incorporators: J. D. Gibby, A. Vossler and C. Gibby, all of Buffalo.

Hartwick Power Co., New York,

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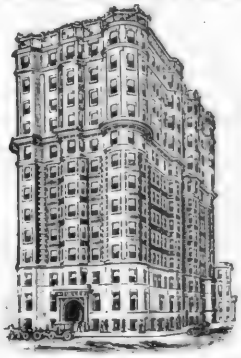
YOU SHOULD STOP AT THE
HOTEL TULLER
NEW AND ABSOLUTELY FIREPROOF



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BECAUSE you can get a room with bath for $1.50 and upwards.
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BECAUSE we serve the very best of everything in our Cafe and Grill Room at moderate prices.
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WATERS
Reducing Valves
for steam heating purposes a specialty.
Also valves for vacuum heating systems.

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MANUFACTURERS OF
Reducing Valves
Pump Governors
Tank Valves
Grease Extractors
Separators, &c.

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BOSTON - MASS.

capital $100,000, to manufacture electricity for light, heat and power. Incorporators: L. J. Mayer and C. Bunce, of New York, and F. I. Hilton, of Jersey City, N. J.

Woods Air Infuser Co., Chicago, capital $25,000, to manufacture and deal in air-infusing, heating and ventilating apparatus. Incorporators: E. W. Woods, William A. Stevens and F. H. Vercoe.

Clefton Co., Owatonna, Minn., capital $15,000, to take over the business of the Clefton Plumbing & Heating Co. of that place. Incorporators: C. J. and Guy J. Clefton, of Owatonna, and Sewall M. Clefton, of Austin.

Central Heating Co., Waterloo, Ia., capital $15,000, to furnish steam heat and power for heating business houses in the vicinity of the Fowler Wholesale Co. Incorporators: C. F. Fowler, president; H. B. Plumb, vice-president; and W. R. Cole, secretary and treasurer.

Edward C. C. Reisel Plumbing Co., St. Louis, Mo., capital $10,000, to conduct a heating and plumbing business. Incorporators: Edward C. C. Reisel, Charlotte Reisel and William S. Goodrich.

Contracts Awarded

Southern Blower Mfg. Co., Memphis, Tenn. heating and ventilating new high schools at that place for $28,000.

Illinois Plumbing & Heating Co., Springfield, Ill., heating and plumbing new Edwards school building. The heating contract amounts to $7,778.

George Erichsen, Ardmore, Okla., erecting heating and power plant at the Agricultural and Mechanical College, Stillwater, for $14,690. John A. Johnson, Oklahoma City, was awarded the contract for the tunnel work on this work for $6,700.

Martin & Wigman, Green Bay, Wis., heating and ventilating new Rock County almshouse at Janesville.

Lane-Pyke Co., Lafayette, Ind., heating and ventilating system in the new shop and laboratory building at Purdue University. The contract amounts to $12,000.

Fargo Plumbing & Heating Co., Fargo, N. D., heating and plumbing new girls' dormitory at the State Normal School for $8,380.

Fitzpatrick & Hoepfner, Columbus, O., heating and ventilating plant, also pumping plant for the new post-office at Toledo. The contract amounts to $30,000.

Moriarty & Rafferty, Willimantic, Conn., heating system and power plant for the new State Normal School at that place. The contract amounts to $9,000; also heating and plumbing new post-office building, that city, for $5,000.

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DEMONSTRATION PLANT
which illustrates the most advanced ideas as applied to **Heating Systems,** especially in connection with Central Generation and Distribution of **Fuel Gas, Electric Current** and **Heat.**
In this plant about 90 per cent. of the lower cost heat units is applied in work.
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Cleghorn Co., Boston, steam heating and ventilating new city hall building at Portland, Me., for $45,062.

John Perra, New Bedford, Conn., heating and ventilating new North End school at New Bedford for $9,175; vacuum cleaning system, Jeremiah Colohan, New Bedford, $1,950.

L. W. Taylor, Boston, heating and ventilating new high school building at New Bedford; the vacuum cleaning contract went to Jeremiah Colohan, New Bedford.

Mulsh Bros., Hollidaysburg, Pa., steam heating and plumbing First National Bank building at Cresson, Pa.

M. J. Callahan, New York, heating 12-story apartment house at Broadway and 108th street, New York, for Charles E. McManus. 14,000 sq. ft. of Kinnar pressed radiators will be installed, the order coming through the New York office.

Trade Literature

The J-M Packing Expert is the title of a new house organ published by the Cleveland branch of the H. W. Johns-Manville Co., Harry Gillett, manager. The publication is devoted to the company's packing products and is to be published on the 20th of every month. It is mailed free of cost to those engaged or interested in work requiring "perfect packings."

Notes on Hygrometry, published by Warren Webster & Co., Camden, N. J., is a newly-issued circular of unusual interest, which, in addition to dealing with the Webster air washer, contains information on methods of measuring humidity, together with the Webster hygrometric chart which was published in THE HEATING AND VENTILATING MAGAZINE for October, 1909.

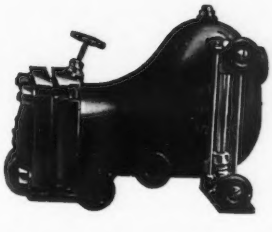
American Steam and Water Boilers are the subject of a well-gotten up catalogue published by Kellogg-Mackay Co., Chicago. The American boiler, many views of which are shown, including sectional views and details, is described as combining all the good points of construction and efficiency attained by the American boiler, and having in addition such improved and unique features as the peculiar design of the sections with their separating and deflecting chambers, gas flues to improve combustion, extended fire chamber and surface, low height and exceedingly large fire and clinker doors. Diagrams of each heater are included, with the various measurements indicated by dotted lines. Tables give dimensions, tappings and prices for steam boilers from 400 to 7,700 sq. ft. radiation capacity and for water boilers from 650 to 12,725 sq. ft. radiation capacity. Regarding the ratings given, the statement is made that the ratings are based upon 2 lbs. pressure at the boiler for the steam boilers and on water at a temperature of 180° F. as it leaves the boiler for the water boilers. The catalogue is attractively printed in colors. Size 4 x 8 in. Pp. 28.

Treatment of Ventilating Air for Shops and Schools is the subject of a descriptive circular issued by the McCreery Engineering Co., Detroit, Mich., and containing much interesting information regarding the conditions met with in various industries due to the character of the work performed. The circular shows how many of the troubles may be eliminated through the treatment of the air by the McCreery air washer.

Cripps Combination Down Draft Steam and Water Heaters have lately been placed on the market by the A. G. Cripps Mfg. Co., Akron, O., and are described and illustrated in new circular matter. The boiler has been perfected to meet the demand for a heater which will burn soft coal of any grade with the elimination of the smoke nuisance. The feature of the design is the arrangement of the down draft firepot occupying a position in the center of the section and operating in conjunction with the ordinary draft fire at the base of the boiler. By this means

McDaniel Improved Steam Trap

WILL DO THE WORK



When you need a Steam Trap buy one you know will work. With a McDANIEL we take all the chances. Don't pay until you are satisfied. We have been 25 years manufacturing Steam Traps and know there is no better trap made. May we send you one for trial?

Watson & McDaniel Co.

160 North 7th Street - PHILADELPHIA, PA.

Send for Catalogue

it is claimed the grate area and actual fire surface is increased 75 per cent. over that contained in the ordinary makes of cast-iron boilers.

Shirley Boilers and Radiators are the subject of an unusually full folder of 18 pages, issued by the Shirley Radiator & Foundry Co., Indianapolis, Ind. A notable feature is the printing of many of the half-tones in light ink and having them form a background for the text.

Belknap Hot Water Circulating Coupling is a new device made by the Belknap Mfg. Co., Bridegport, Conn. By its use it is necessary only to extend the risers of a water heating system directly through the floor to the valve and coupling, thus obviating the necessity of extending the return pipe to the return end of the radiator. The connection is made by screwing the circulating coupling into the end of the radiator, the hot water valve being screwed into the coupling. The hot water passes from the valve through the tube in the coupling to the radiator. The return water passes through the outer opening in the coupling between the tube and outer casing of the coupling to the return pipe. The coupling is also adapted for use in expansion tank connections, saving four joints.

Royal Down Draft Boilers have been added to the product of Hart & Crouse Co., Utica, N. Y., to meet the new smoke ordinances in many of our cities.

Vacuum Ventilators, illustrated in new circulars being sent out by the Vacuum Ventilator Co., 82 Purchase street, Boston, are designed to take advantage of the fact that Nature abhors a vacuum. They are so constructed that their rounded surfaces deviate the air currents so that they pass directly across the vertical outlets and in so doing exhaust the air which is in the ball of the ventilator. A vacuum is thus created in the ball and then Nature asserts herself and forces the air which is in the rooms below to rush up into the ventilator and destroy the vacuum. As long as the wind blows at all, this process is continuous. It is of interest to heating and ventilating engineers to know that this ventilator absolutely prevents downdrafts and at the same time creates and maintains strong up-drafts. The vacuum ventilator is being used in ventilating toilet rooms in school houses and other public buildings and has been found to operate satisfactorily even without the assistance of aspirating coils. The feature is emphasized that the vacuum ventilator is quite stationary and being without any mechanical attachment is noiseless. It is also declared to be particularly effective when used on buildings within which large numbers of people

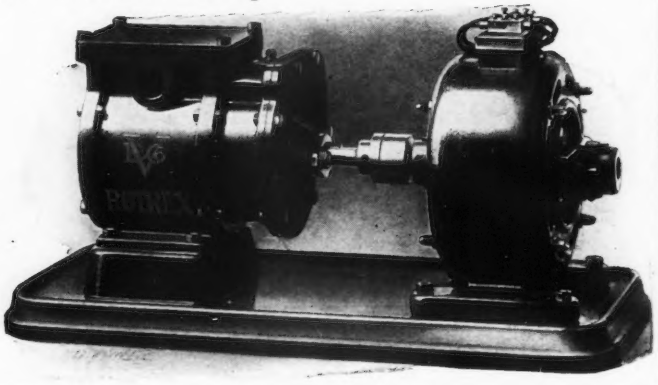
The "ROTREX" System of Vacuum Cleaning

DISCHARGES THE DIRT DIRECT TO THE SEWER

With the "ROTREX" System the dust and dirt after being extracted by the suction *do not again become exposed to the atmosphere either inside or outside the building.*

The "ROTREX" not only insures the extraction of all dust and dirt but insures their *sanitary removal* from the rooms—from the premises.

The "ROTREX" System therefore represents the highest point of excellence yet attained in vacuum cleaning.



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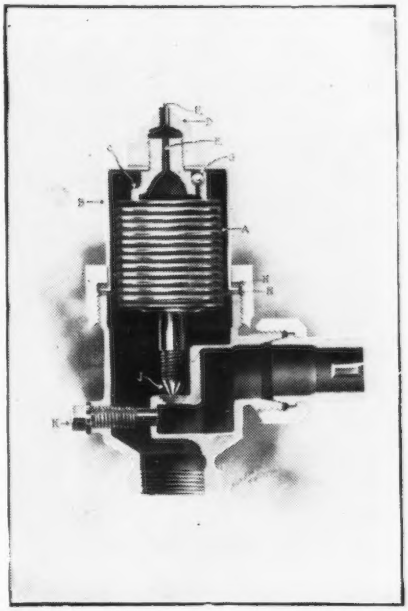
Branch offices in all principal cities.

congregate and to work equally well whether on the highest point of a building or below the level of another building.

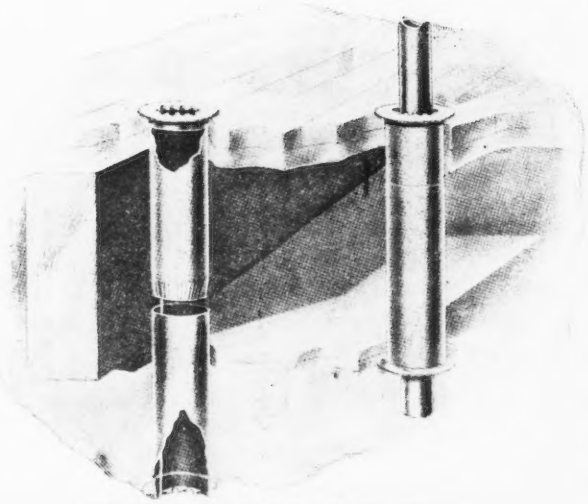
Sylphon Thermotor Radiator Valve, made by The Fulton Co. Knoxville, Tenn. is described in a new circular as designed for use on all steam heating systems where air and water of condensation are drawn from the radiators through the same connection. The principal feature of this valve, which is shown in the accompanying illustration, consists of a termostat A constructed on the well-known sylphon or metal bellows principle. It has hermetically sealed within its flexible walls a small portion of scientifically compounded volatile fluid. The thermostat is held in position inside the bonnet B by support C and jam nut D. A small air inlet E is provided with a felt strainer F and ball check G. Insulating rings H. H, retard the conduction of heat from valve body I to bonnet B and thermostat A. The valve pin J is normally in the raised position so as to have the valve open to the free passage of water and air from the radiator. The blow-out plug K makes it possible to clean the valve out at any time without disturbing any other connection.



SYLPHON THERMOTOR RADIATOR VALVE

Precise Valve, for domestic, public and central heating systems, is an interesting device made by the Haynes-Thompson Co., Philadelphia and described in newly-issued circulars. It is adaptable for atmospheric, vapor, vacuum and modified systems of heating and its ability to regulate the heat from each radiator is emphasized.

The A. & J. Floor Sleeve Is Built on the Telescope Plan



It is easy to adjust the A. & J. Floor Sleeve

The sleeve is used for insulating steam pipes running through floors and partitions. The telescope construction admits of an adjustment of from 12 to 24 inches. The illustration shows the position of ceiling plate and strap before ceiling is finished. The strap, which is riveted to the upper section of sleeve, allows the ceiling plate to hang below the plaster from 4 to 6 inches. After the ceiling is properly finished, the plate, or lower section of sleeve, is adjusted in place, the strap cut to the proper length and formed around the lip of lower plate, thereby firmly holding the sleeve in place.

Send for price list on sizes ranging from ½ inch to 8 inches, from which a liberal discount is allowed.

Manufactured by

MELLISH-HAYWARD CO., Chicago, Ill.

Business Chances

Washington, D. C.—Sealed proposals will be received at the office of the supervising architect, Treasury Department, for the following-named work:

Until February 18, 1910, for the construction (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of the laundry and attendants' quarters U. S. Marine Hospital, Louisville, Ky.

Until March 9, 1910, for the extension, remodeling, etc. (including plumbing, gas piping, heating apparatus, electric wiring and conduits), of the U. S. Post Office and Court House at Athens, Ga.

Until March 11, 1910, for the extension, remodeling, etc. (including plumbing, gas piping, heating apparatus, electric conduits and wiring and standard clock system), of the U. S. Post Office and Court House at Jackson, Tenn.

Until March 24, 1910, for the construction (including plumbing, gas piping, heating apparatus, electric conduits and wiring and standard clock system) of an extension, remodeling, etc., to the U. S. Post Office and Court House at Sacramento, Cal.

Washington, D. C.—Extensions of time for the opening of bids have been announced as follows:

Lynchburg, Va., U. S. Post Office and Court House, from February 10 to March 3, 1910.

Pawtucket, R. I., U. S. Post Office, from January 25 to February 25, 1910.

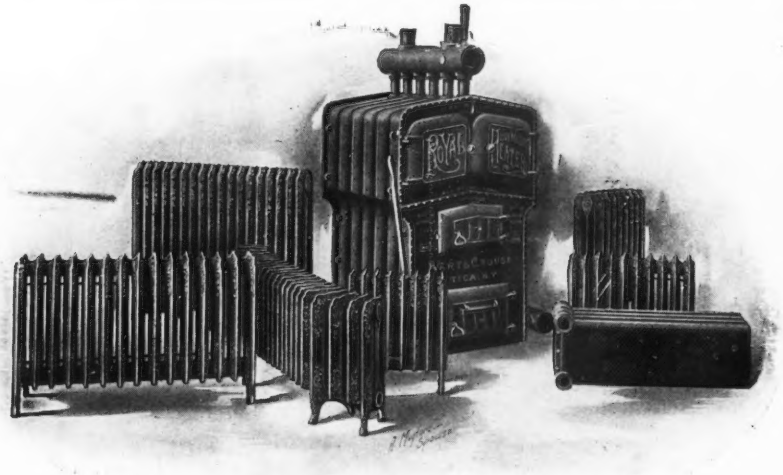
Meridian, Miss.—U. S. Post Office and Court House, from February 8 to March 2, 1910.

Until March 14, 1910, for the extension, remodeling, etc. (including plumbing gas piping, heating apparatus, electric conduits and wiring and standard clock system), of the U. S. Post Office and Court House at Frankfort, Ky.

Wanted

Position Wanted. An engineer with 4½ years' experience with large firm in the middle west would like to make a change. Can figure and lay out house heating, power and ventilating work. Fine references. Address Middle West, care of HEATING AND VENTILATING MAGAZINE.

Unusual Opportunity. Will sell a part interest in an old established plumbing and heating concern in Buffalo, N. Y., to an experienced heating and ventilating engineer. Must be a thorough and competent estimator and manager. State experience. Other interests take up most of present owner's time. Address Buffalo, care of HEATING AND VENTILATING MAGAZINE.



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